TENTH ANNUAL REPORT

OF THE

Sanitary Commissioner for the Government of Bombay,

1873.

Parts I-II

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PART I.

DESCRIPTIVE AND PHYSICAL GEOGRAPHY.

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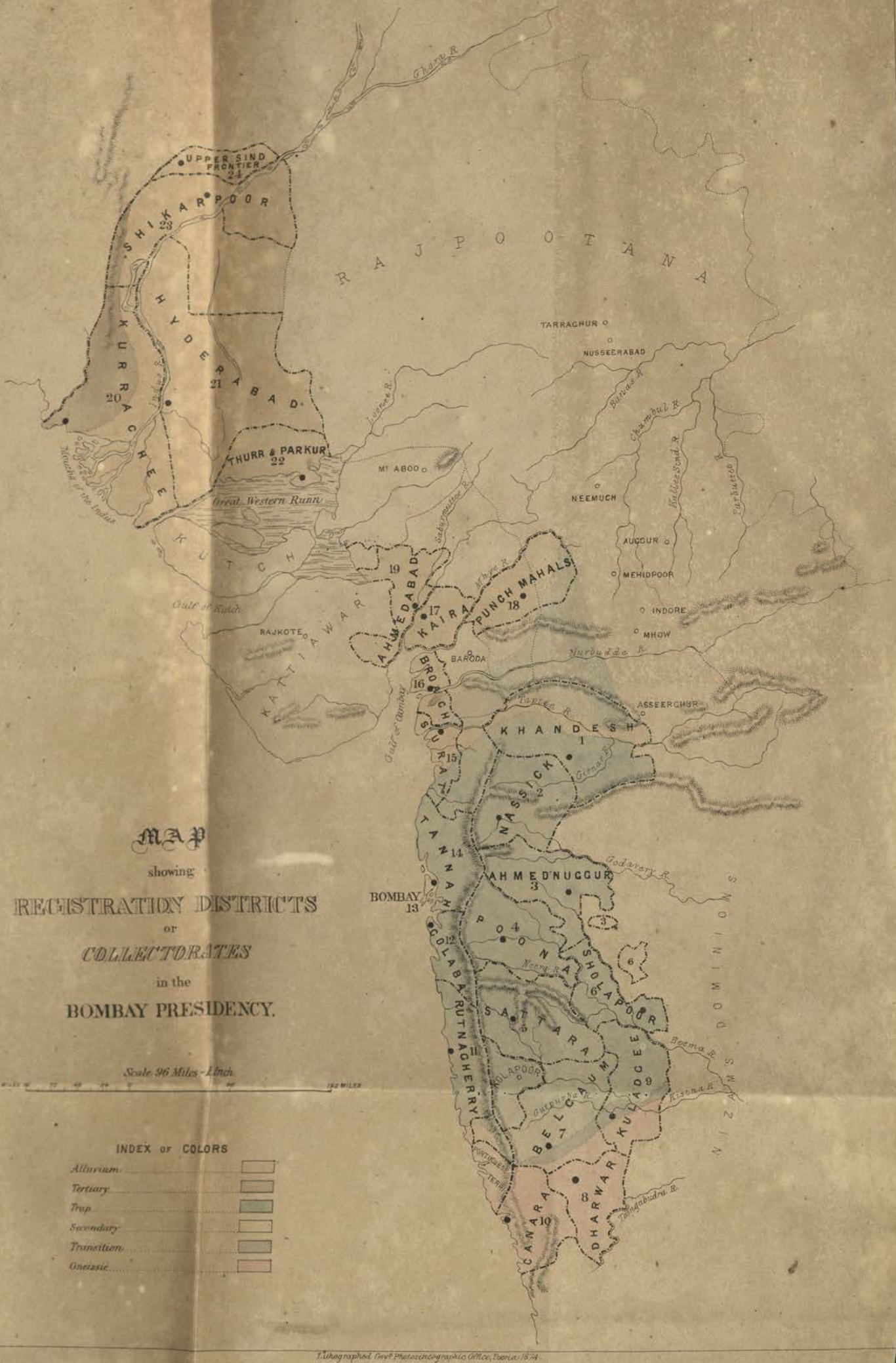


MAP

showing

REGISTRATION DISTRICTS

or

COLLECTORATES

in the

BOMBAY PRESIDENCY.

Scale 96 Miles = 1 Inch.

INDEX OF COLORS

- *Alluvium*
- *Tertiary*
- *Trap*
- *Secondary*
- *Transition*
- *Gneissic*

Lithographed Govt Photozincographic Office, Poona 1874

REPORT

OF THE

SANITARY COMMISSIONER FOR BOMBAY

FOR THE YEAR 1873.

PREFATORY.

In the Report for 1871 allusion was made to the difficulty of prefacing it with an outline of the descriptive and physical geography of the *Presidency* generally, and of the several *Registration Districts* or *Collectorates* in detail; and, although it cannot be said the difficulty has been overcome, an attempt is here made to put together such particulars as are more readily obtainable.

Mr. Blanford's paper on the subject.

2. Not many years ago Mr. Blanford, of the Geological Survey, was here on special duty; and, thinking he could give me the required information, I wrote to him. In his answer he says, that not only had he written all that he himself knew of the subject, but he had compiled whatever could be gleaned from the writings of others. These priceless papers had been specially prepared for the *Bombay Gazetteer*; but they are lost to us for ever, as they, with others, were stolen from the Collector's Office in Poona. The extent of the loss is only realised, when one thinks of what had been Mr. Blanford's opportunities for observation, and what was his capacity as an observer.

3. Before taking the Presidency in detail, or before looking at it as a component of a yet larger area, let us glance at the chief geographical features of the area itself in its entirety.

4. For the India Office, Mr. Trelawny Saunders has drawn up "A Sketch of the Mountains and River Basins of India," and, within the compass of 31 pages, he has described them with surpassing clearness; so much so, that I cannot do better than quote verbatim those portions which relate to general configuration.

Mr. Trelawny Saunders' Sketch.

A Northern and a Southern system of Mountains.

5. Dividing the *mountains* of *India* into two distinct systems, a *Northern* and a *Southern*, it is shown how they are separated by a continuous belt of lowland which extends from the Arabian Sea to the Bay of Bengal. On the west this lowland is washed by the Indus and its branches, and on the east by the streams

of the Ganges basin. The western slope includes the Paunjab, Sind, and the greater portion of Rajpootana. The eastern or Ganges lowland comprises the greater part of the North-West Provinces, Oude, and the Lower Provinces of Bengal. At the water-parting of the two rivers the lowland has an elevation of only 900 feet above the sea; where the five rivers unite with the Indus, 450 miles from the sea, it is 369 feet; and at the confluence of the Ganges and Jumna at Allahabad, 846 miles from the sea, it is 340 feet.

The Terai.

6. The northern edge of the lowland, at the foot of the hills which skirt the Ganges plain, is generally a swamp full of springs and marshes, called the Terai. The first range of hills is separated from the Himalaya mountains, and forms a distinct series from 2,000 to 3,000 feet high. The intervening valley is here sometimes called a "Dhoon," as Dehra Dhoon.

The northern mountains.

7. The *northern mountains* consist of the Himalaya, with offsets extending from the eastern and western extremities down to the sea,—at Capes Negrais and Monze respectively,—the whole enclosing India in a vast amphitheatre.

The Himalaya.

8. The *Himalaya* culminate in Mount Everest, 29,000 feet, the highest known peak in the world. They form the southern buttress of the Thibitan plateau, where boundless plains are spread out at a height of 16,000 feet above the sea, exceeding in altitude the highest summits of the Alps, but still habitable, rich in minerals, and yielding pasturage for innumerable sheep.

9. From the Dhoons there is a rapid rise to about 5,000 feet, and the ascent is continued to summits forming within a horizontal distance of 60 miles from the plain a range of snowy peaks varying in elevation from 20,000 to 29,000 feet.

10. The valleys which separate the peaks are not more than about 6,000 feet above the sea, but within the range of peaks they are sometimes above 10,000 feet. They generally run parallel to the main range till they break through the outer ranges by intersecting gorges.

11. On the north the Himalaya descend into the valleys of the Sanpu or Bramapootra, flowing eastward, and into the valleys of the Sutlej and Indus, flowing westward; while the southern peaks descend to a base for the most part less than 1,000 feet above the sea, the base of the northern peaks is elevated between 10,000 and 15,000 feet.

12. The summit of the Himalaya consists, then, for the most part, of a double line of peaks enclosing a series of high valleys running parallel to the axis of the mass.

Influences of the Himalaya.

13. To the above it may be added, that although the Himalaya are *trans* Indian, in the strict sense of the term, they have an influence within the peninsula which cannot be overstated. A part of their northern drainage gives to the Paunjab and Sind their valued rivers. From their southern slopes come those rich streams which make a garden of the Ganges basin; and for those tracts which lie beyond the direct reach of their waters there is the indirect influence upon climate.

The southern mountains.

14. The *southern mountains* are described as forming a triangular table-land extending through twenty degrees of latitude, its base upon the lowland of the Ganges and the Indus, its apex near Cape Comorin, and its sides on the Bay of Bengal and the Arabian Sea. The general elevation seldom exceeds 2,000 or 3,000 feet, but the Dodabetta peak, in the Neilgherries, at the southern extremity of Mysore, is 8,640 feet. It is the culminating point of all south of the Himalaya.

15. The first group of the southern system is distinctly defined by the Aravelli mountains, by the Ganges hills including the northern face of the Kymore range, by the southern face of the Kymore range skirting the river Sone, and by its continuence along the Vindhya mountains, which rise abruptly from the Nerbudda. The Salumber ranges or the slopes from the Malwa plateau, which connect the Vindhya range with the Aravelli, complete the circuit.

Second group.

16. The second group is formed by the Satpoora mountains. Their limit is well defined by the Nerbudda on the north, and the Taptee on the south, also by the plains of Nagpore and Berar, and the plain of Chutteesgurh. In continuation of the Satpooras a mountianous plateau extends as far as the Ganges river, where it terminates in the Raj Mahal hills. This highland is bounded by the Sone on its north-west face, which descends abruptly to that river, and is divided by it from the Kymore range. The south-eastern slope of this plateau is towards the Bay of Bengal, and it is drained by the Mahanuddee, Braminee, Byturnee, Sabunrika, and Damooda rivers. The Raj Mahal hills connect the eastern and northern slopes of this second group of mountains. Between this point and the Bay of Bengal at Balasore, the mountains rise very gradually from the delta of the Ganges; but amongst them is Parasnath, over 4,000 feet.

Cuttack Hills and Eastern Ghauts.

The Neilgherries.

17. From Balasore southwards to Lake Chilka are the Cuttack Hills, and between Lake Chilka and the Cauvery river they are called the Eastern Ghauts. North of the Cauvery they face to the south, and attain their highest elevation in the Neilgherry and Kundah mountains, which descend to the sea.

18. Southwards the gap of Coimbatore connects the lowland of the west coast with that of the Bay of Bengal, and separates the Kundah mountains from a lofty range which extends nearly to Cape Comorin.

The Western Ghauts.

19. The edge of the plateau towards the Arabian Sea, from the gap of Coimbatore to the Taptee, is called the Western Ghauts.

The lowland below the Ghauts.

20. The lowland between the Eastern Ghauts and the Bay of Bengal is divided by the Kistna river between the Circars on the north, and the Carnatic on the south. On the west coast it is divided between the Konkan on the north, and Kanara and Malabar on the south.

Guzerat.

21. North of the Taptee the lowland forms the plain of Guzerat between the slope of Malwa, and the mountains of the peninsula of Kattywar and the island of Kutch. This plain is about 250 miles long and 120 broad, and it extends to Mount Aboo, where it joins the great plain of the Indus.

Sind.

22. The plain of the Indus stretches westward to the foot of the mountain range which forms the boundary between the province of Sind and Beloochistan.

The River Basins.

23. In speaking of the *River Basins* of India, attention is directed to the true value of the terms water-parting, watershed, and watercourse. It is pointed out that the *water-parting* is the line which connects all the summits of the slopes of any given basin. The slopes themselves are the *watershed*, and the base of the slopes is the *watercourse*.

24. The rivers of India belong to the southern watershed of Asia, where that continent advances upon the Indian ocean in three vast promontories or peninsulas. Of these the central is *India*, the western is *Arabia*, and the eastern contains *Burmah*, *Siam*, *Cambodia*, and *Assam*.

25. Two great recesses of the Indian Ocean separate India from Arabia and the eastern peninsula, namely, the Bay of Bengal and the Arabian Sea. Hence the Indian watershed is divided into two parts, one of which drains into the Bay of Bengal, and the other into the western side of the Arabian Sea.

26. The western basins of the Bay of Bengal contain the Ganges, and Bramapootra, Subunrika, Byturnee, Braminee, Mahanuddee, Godavery, Kistna, Pennaur, Pelar, Penar, Vellaur, Cauvery, Vigay, Vypar, Tamburpurnee, and many smaller streams.

27. Arranged according to magnitude, the Ganges and the Bramapootra are of the first class, the Godavery and the Kistna of the second, the Mahanuddee, Pennaur, and Cauvery of the third, the remainder before-named of the fourth. The group of inferior streams form a fifth class.

28. The watershed of the Bay of Bengal includes the whole of India eastward of the western ghauts and the Aravelli range, except the narrow valleys of the Taptee and the Nerbudda, which serve in a remarkable manner by a reversal of the general slope to divide the Deccan on the south from the plateau of Malwa on the north.

29. The Indian part of the watershed of the Arabian Sea may be divided into three groups :—

1. The coast group from Cape Comorin to the southern limits of the Gulf of Cambay.
2. The Taptee and Nerbudda, the Myhi, Loonee, and other smaller streams descending from the Aravelli range, and the plateau of Malwa.
3. The basin of the Indus.

30. The coast group from Cape Comorin upwards includes the Perriaur, Ponany, Naitravaltee and Goorpoor, and the Kalanuddee which empties itself into the inlet of the sea forming the port of Carwar.

31. The Raichol and Goa rivers surround the island of *Goa* in Portuguese territory. All north of this belong to the *Bombay Presidency*, and will be noticed when speaking of the districts in detail.

32. Here then is the sketch by Mr. Trelawny Saunders, and, when read by the light of his maps and sections, it gives at a glance the chief points of general configuration. Speaking geographically it shows, that the sub-Himalayan lowland really belongs to Asia, and that what may be termed India proper begins at the first group of southern mountains. Mr. Blanford thinks there was a time when the separation was actual and complete. When from sea to sea there was uninterrupted communication; but whatever was the former condition, its eastern lopes are now the Ganges basin. Far north are those great barriers of eternal now, but not one drop of their drainage passes this lowland.

33. Then comes the group of mountains extending almost across the peninsula, draining partly into the Bay of Bengal, and chiefly into the Gulf of Cambay by the Taptee and the Nerbudda.

34. Passing the northern ghauts which separate the basins of the Taptee and the Godavery, we are fairly on the true Indian Peninsula. There is now a vast high-lying table-land, the *Deccan*—its main water-parting on its western border, and its long slopes trending easterly, but breaking up into ghauts before reaching the Bay of Bengal. Cut off from Himalayan snows, this tract is naturally without *great* rivers, and there would be a positive want of water were it not that its western chain runs longitudinally, and is thus a catchment area for the immense volume of water brought to it by the S.W. monsoon.

The Deccan.

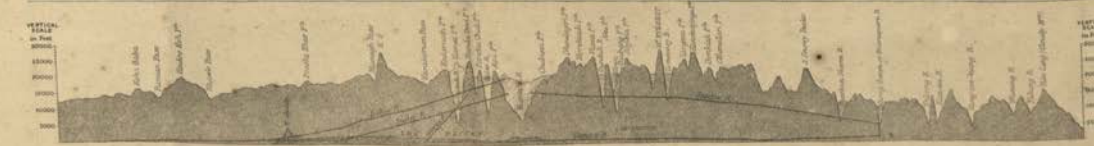
Section of the Himalaya Mts and Tibet between Longitude 78° & 80°

Section of the Himalaya Mts and Tibet about Longitude 86°

A SKETCH OF

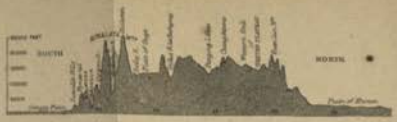
THE RIVER BASINS OF INDIA.

AND ITS BORDERS



A comparative Series of vertical sections:-

1. Through the peaks and valleys of the Himalaya Mountains.
2. Along the rivers Sutlej, Indus, Jhelum and Ganges forming the northern base and the southern base of the Himalaya Range.
3. Across the Deccan in Latitude 16° N.



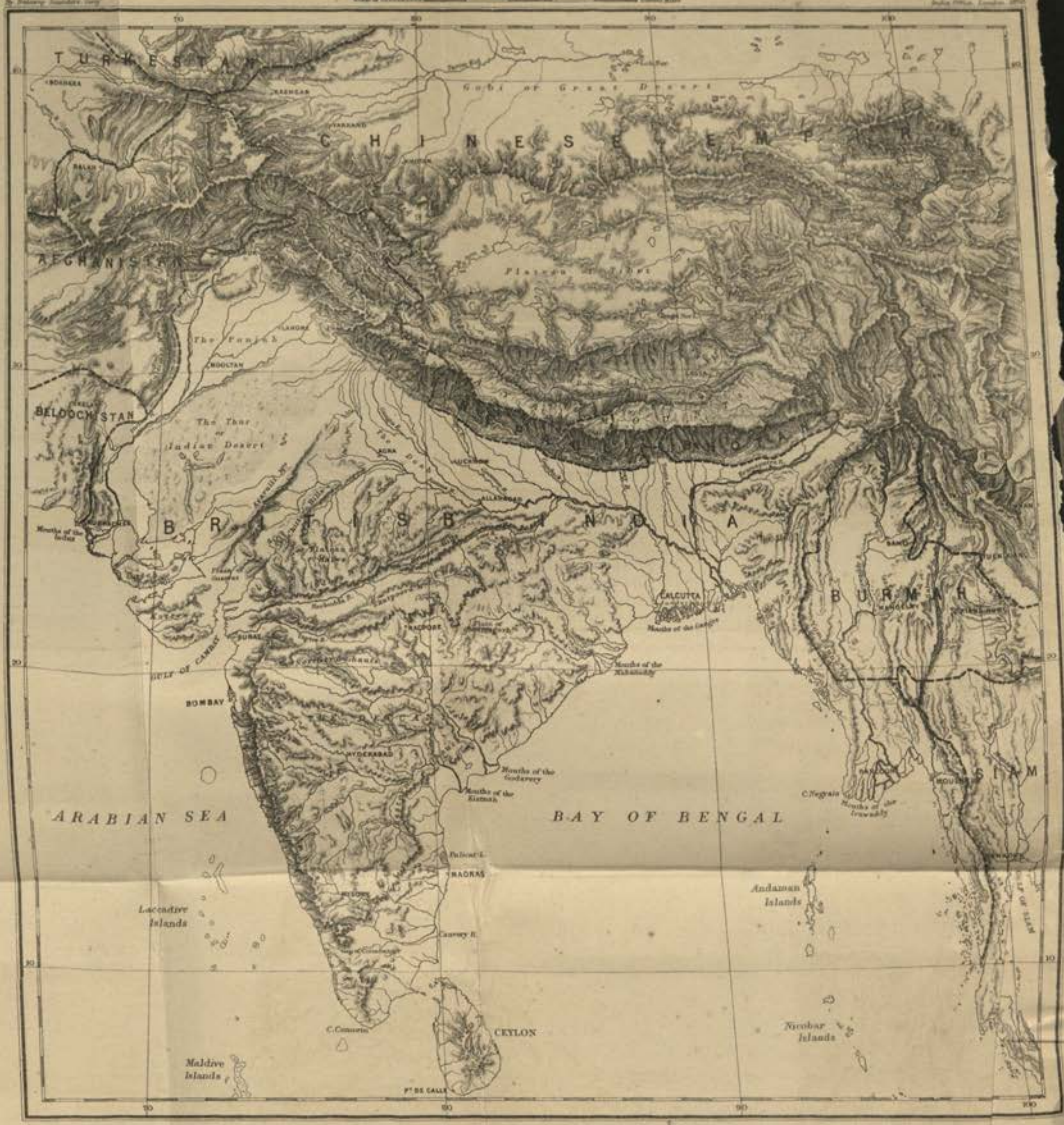
Section of the Himalaya Mts and Tibet, between Longitude 79° & 80°

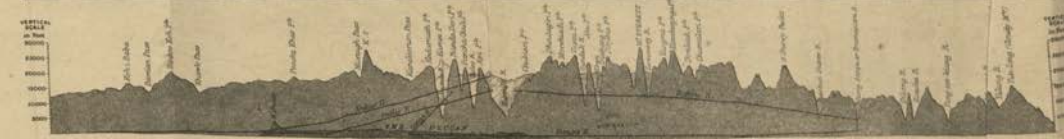
A SKETCH OF

THE MOUNTAINS OF INDIA

AND ITS BORDERS

Section of the Himalaya Mts and Tibet, about Longitude 88°



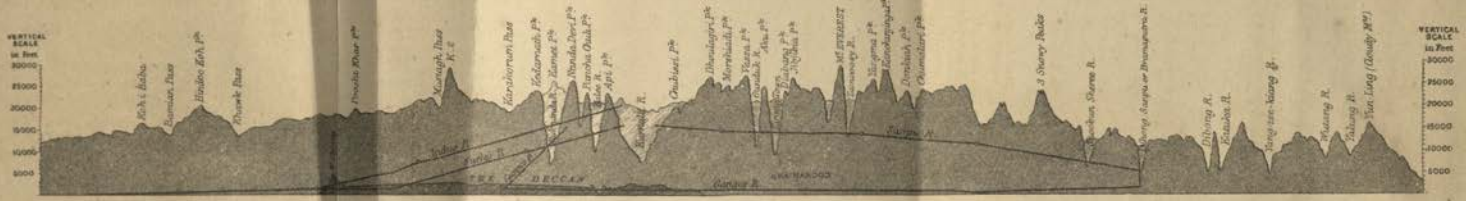


A comparative Series of vertical sections.

1. Through the passes and valleys of the Himalaya Mountains. 2. Along the rivers Sutlej, Indus and ranges defining the northern base and the southern basin of the Mountain Ranges. 3. Across the Deccan in latitude 18° N.

Photozincographed: Government Office Poona 1872.

THE MOUNTAINS OF INDIA



A comparative Series of vertical sections:-

1. Through the peaks and valleys of the Himalaya Mountains.
2. Along the rivers Sanpu, Sutlej, Indus, and Ganges, defining the northern base and the southern base of the Mountain Range.
3. Across the Deccan in Latitude 18° N.

Section of the Himalaya Mts and Tibet between Longitude 79° & 80°

Section of the Himalaya Mts and Tibet about Longitude 85°

Photozincographed, Government Office Poona, 1873.

35. To the south there is a higher plateau, and the mountains are continued to Cape Comorin. A maritime strip borders the peninsula.

36. Such is the area in its entirety, and now we may take its western provinces.

The Bombay Presidency.

37. A reference to the map will show that, as regards area, the Bombay Presidency is a minor fraction of the great peninsula; but, considering its advantage of position, it is not perhaps too much to say, that its size and its importance are in inverse ratios.

38. Formerly, the Registration Districts,—the Collectorates,—were arranged for their mortuary statistics under the ordinary Revenue Divisions, thus:—

Northern Division.	*Southern Division.*
Ahmadabad.	Ahmadnagar.
Broach.	Belgaum.
Kaira.	Dharwar.
Khandesh.	Kaladgi.
Kolaba.	Kanara.
Nasik.	Poona.
Panch Mahals.	Ratnagiri.
Surat.	Satara.
Tanna.	Sholapur.

Sind.

Haidarabad.
Karáchi.
Shikarpur.
Thar and Parkur.
Upper Sind Frontier.

The City of Bombay.

39. Assuming that mortality should be studied with reference to the material conditions under which it occurs, the above grouping may be recast with advantage. The conditions of life in the Konkan and the Deccan are so very different that the death-rate for each must be considered separately. Taking each as a separate and distinct area, the sub-divisions of each may amongst themselves be shown one against the other, and the collective totals of all may be compared; but there should be no such linking together, as Khandesh and Tanna—Poona and Ratnagiri.

40. If it be found that, in one district, there is a trap formation; that in another it is metamorphic, and that elsewhere it is alluvial; to a certainty these differences will carry with them other differences of physical condition which cannot be overlooked; but, supposing the geological formation was everywhere the same, there would still be the difference of temperature and rainfall, due to difference of elevation, there would still be the difference of an inland position and proximity to the sea: so, in grouping the districts as areas of observation, these and other points have to be considered.

41. The re-arrangement now proposed is based upon similarity of soil, and water-supply, of altitude, and all that constitutes climate; and, by thus grouping them, the people can be observed under those physical and incidental influences to which, in their several districts, all must alike be subjected. It can be noted

how far, for good or ill, they are affected by them; and, carefully registering the chief causes of mortality, we may eventually try and connect them with such of the more prominent, telluric, and atmospheric conditions as are peculiar to the locality.

42. Upon the geology of the Presidency generally I again quote largely, this time from the sketch by Mr. Blanford in the Records of the Geological Survey of India, Volume 5, Part III., pages 82—102.

43. Mr. Blanford divides the Presidency geologically, as well as physically, into two parts. The north-western includes Sind, Kutch, and Guzerat; the south-western comprises all south of the Nerbudda—the Mahratta Country;—and, speaking in a general way, that river may be said to divide the two regions. A part of the distinction is climatic, but the essential difference is due to the difference of geological formation.

44. In the Mahratta Country the geological formation is of the simplest kind, chiefly horizontal strata of basalt and similar rocks. Hence the peculiar features of the country and the fertility of its soil; hence also the thinness and stunted growth of the forests generally.

45. The rocks of the Bombay Deccan are precisely similar to those of neighbouring portions of India proper; but the rocks of Guzerat, Kutch, and Sind belong to continental Asia, being continuous with those found in Persia and Arabia.

46. The following is the list of formations in descending series :—

VI.—Later tertiary series ...	1.	Black soil.
	2.	Littoral concrete.
	3.	Alluvium of Sind, Kutch, and Guzerat.
	4.	Laterite of the Konkan.
	5.	Surface gravels of Sind.
	6.	Ossiferous gravels of river valleys.
	7.	Upper tertiaries of Kattywar and Kutch.
V.—Older tertiary or nummulitic series	1.	Older tertiaries of Surat, Broach, Kattywar, Kutch, and Sind.
	2.	Perim Island bone-beds.
	3.	Laterite of the Deccan.
IV.—Deccan series	1.	Deccan traps.
	2.	Inter trappean beds of Bombay.
	3.	Ditto of Dohad, Nagpur, Nerbudda valley, &c.
	4.	Cretaceous beds of Bagh.
III.—Oolitic series	1.	Jurassic rocks of Kutch, upper.
	2.	Do. do. lower.
II.—Vindhyan series	1.	"Diamond sandstone," and sandstone of Belgaum, Kaladgi, and Ratnagiri.
I.—Metamorphic and sub-metamorphic series...	1.	Champanir beds.
	2.	Granite, gneiss, mica schist, &c.

I.—Metamorphic and Sub-metamorphic Series.

47. *Metamorphic Rocks.*—These include all the crystalline formations, such as granite, svenite, diorite, &c., gneiss, hornblende schist, mica schist, quartz, crystalline limestone, &c., whether laminated or not. Within the Presidency they are

comparatively rare. None are known in Sind or Kutch; but, on the north of the Runn, they are seen at Nuggur Parkur; they are found also at Aboo, in northern Kattywar, in the Rewa Kanta, near Palitana, and Gogo. In the Deccan they are only found in the southern portion of Belgaum, in the south-east of Kaladgi, and in Dharwar. In the Konkan they re-appear north of Malwan, and from this point they are continued down to Cape Comorin, often covered by thick deposits of laterite.

Sub-metamorphic Rocks.—These are only seen at Champanir, east of Baroda. They are chiefly quartzites, or rock intermediate between quartzite and sandstone conglomerates, slates and limestones, and ferrugimous bands, some of magnetic iron ore. The limestone is sometimes unaltered, sometimes crystalline. The slate is sometimes so fissile, that it might probably serve for roofing purposes. The most characteristic beds are the conglomerates. The matrix being a coarse sandstone containing pebbles, rounded blocks of granite, quartzite, talcose slate, and crystalline limestone.

II.—Vindhyan Series.

48. On the north the rocks of this series lie without the Presidency. In the south they form a well marked belt of some width intervening between the trap and the metamorphic series. In the Konkan they appear at Ochra, north of Malwan, and they are well seen at the foot of the Phonda Ghaut. Above the ghauts the quartzites reappear in the south at Kolhapur, Belgaum, and Kaladgi.

The belt here spoken of is bounded on the N. by the southern ragged edge of the Deccan trap; on the S. by trap for some distance, and then by the northern edge of the great gneiss area of Madras. On the E. it is broken 30 miles E.N.E. of Kaladgi where it crosses the Krishna, but it reappears near Mudebahal, and stretches away N.E. towards Goolburga. The rocks of this series are limestones, shales, and sandstones sometimes hard and semivitrious, like quartzite.

III.—Oolitic Series.

49. The rocks of this series are confined to Kutch.

IV.—Deccan Series.

50. These rocks extend over the greater portion of the Bombay Deccan and the Konkan; they are chiefly of volcanic origin. The two principal varieties are a porphyritic basalt, and an amygdaloidal earthy trap. The trachytic traps, with felspar predominating, are less common.

Although there can be no doubt as to the volcanic origin of these rocks, their horizontality and stratification render them so different in appearance from similar rocks now forming in those countries in which there are active volcanoes, that it is clear they must have formed under conditions very different from those now occurring elsewhere. Nor, throughout the greater part of the area, are there any apparent foci from which the currents of lava could have been poured out.

The lavas were poured out in a very liquid state, and spread themselves in wide sheets of small depth over large areas of country. The earthy beds may possibly have issued as volcanic mud, not necessarily at high temperature. Both the *infra* and the *inter* trappean beds are apparently of fresh water origin, and contain fossil remains.

V.—Older Tertiary or Nummulitic Series.

51. The rocks of this series comprise all above the trap; they are less known than those of the older formations. The beds contain organic remains. Near Surat, at the base of the tertiary formations are thick beds of ferrugimous clays, just like laterite. They are sedementary deposits, and with them are interstratified beds of gravel, and conglomerate containing limestone and agates with other quartzose minerals from the trap.

In this series is the laterite of the Deccan, a clay strongly but unequally impregnated with peroxide of iron. Its surface is coated with hydrated *peroxide* of *iron*, or brown hœmatite, and is very uneven owing to the washing away of those portions which were unimpregnated with iron. It is more recent than the volcanic rocks, and may be of aqueous origin.

VI.—Upper Tertiary and recent Beds.

52. The classification of these is still imperfect. Amongst them is the laterite of the Konkan, more recent than that of the Deccan, and the Porebunder stone, milliolite, so largely used in Bombay for building purposes. It is made up of minute foraminifera, with grains of quartz and hornblende.

The surface gravels, alluvium, littoral concrete, and soils will be noticed hereafter.

53. Recasting our districts, by Mr. Blanford's geological divisions, they would be as follows:—

1	Khandesh. Nasik. Ahmadnagar. Poona. Satara. Sholapur. Belgaum.	The Deccan.	Trap area.
2	Ratnagiri. Kolaba. Tanna.	The Konkan.	
3	Dharwar. Kaladgi.	The Deccan.	Southern metamorphic area, other rocks intermixed.
4	North Kanara. Sawantwari.	The Konkan.	

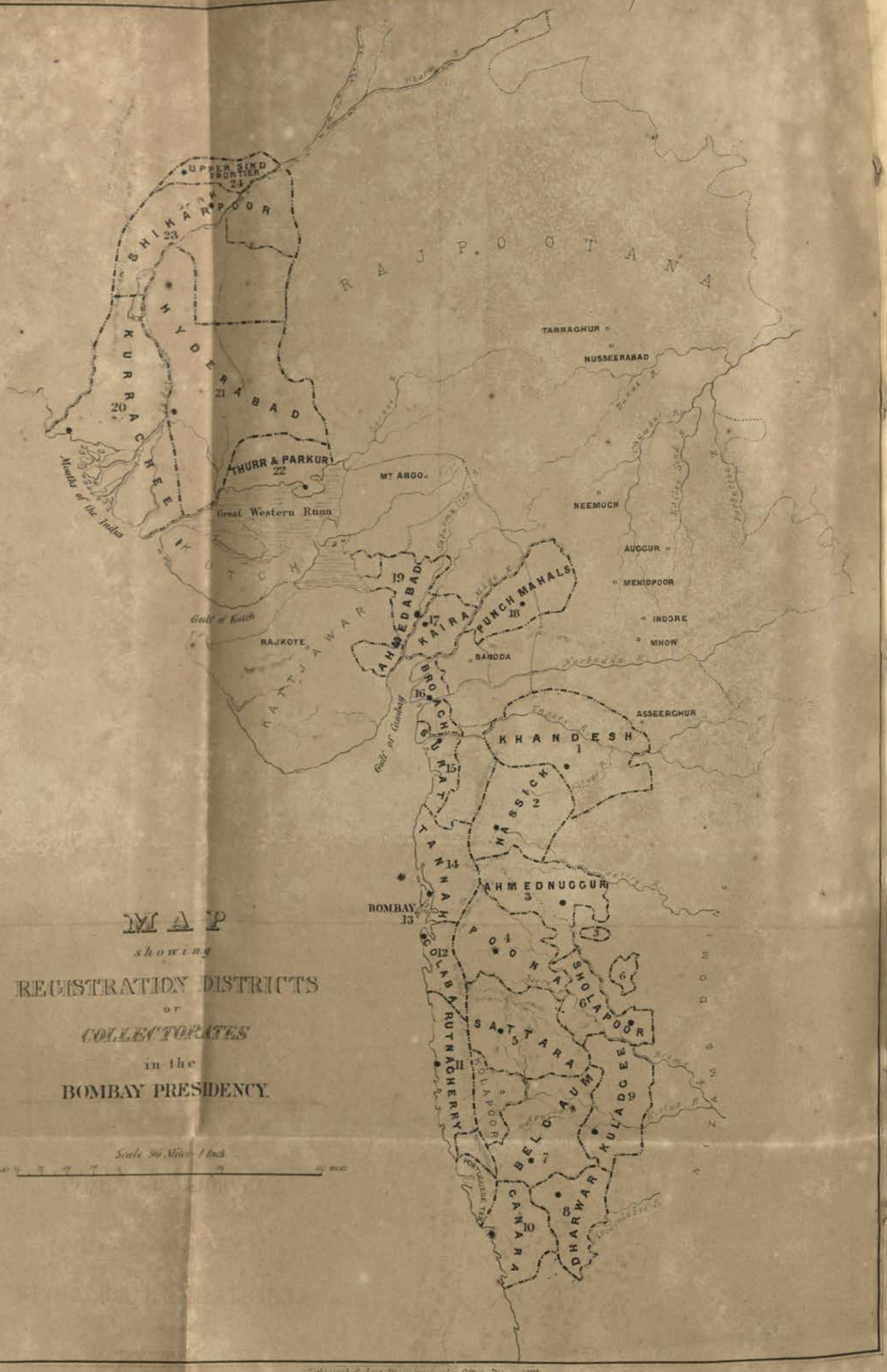
5. Guzerat.....Alluvial.
6. Kattywar.....Metamorphic, trap and tertiary.
7. Kutch .....Sandstone and shale do.
8. Sind.....Tertiary, limestone and shale, gravels and alluvium

54. This is a purely geological arrangement, but obviously it carries with it certain distinctive peculiarities of physical condition, and is a sound basis for a division into areas of registration for mortuary statistics.

55. As registration has not been extended to Kutch, or to Kattywar, or to Sawantwari, they may be taken out of the list. Dharwar, too, and Kaladgi both lie above the ghauts, so they may be included with the rest of the higher level; whilst North Kanara being partly above, and partly on the littoral, may be assigned to the Konkan.

56. In this way the Presidency may be divided into four divisions, and I propose to arrange the districts as follows:—

1.	Khandesh.	The Deccan.
2.	Nasik.	
3.	Ahmadnagar.	
4.	Poona.	
5.	Satara.	
6.	Sholapur.	
7.	Belgaum.	
8.	Dharwar.	
9.	Kaladgi.	



MAP

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Scale 96 Miles 1 Inch

Lithographed Govt. Photozincographic Office, Poona. 1873

A

ELEVATION AND DECLINATION OF THE COUNTRY ABOVE THE GHÂTS, SHOWING THE GEOLOGICAL STRUCTURE OF THE SAME.

FIG. 1.

BETWEEN 73° 35′ AND 74° 49′ EAST LONGITUDE AND THE PARALLELS OF 18° 50′ AND 19° 10′ 31″ NORTH LATITUDE.

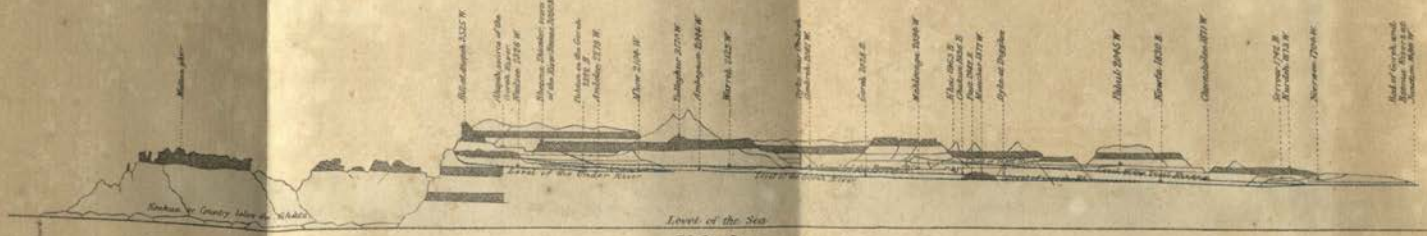
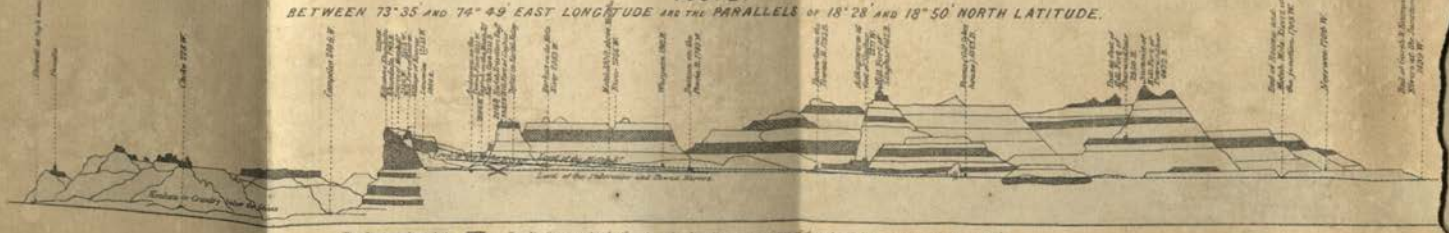


FIG. 2.

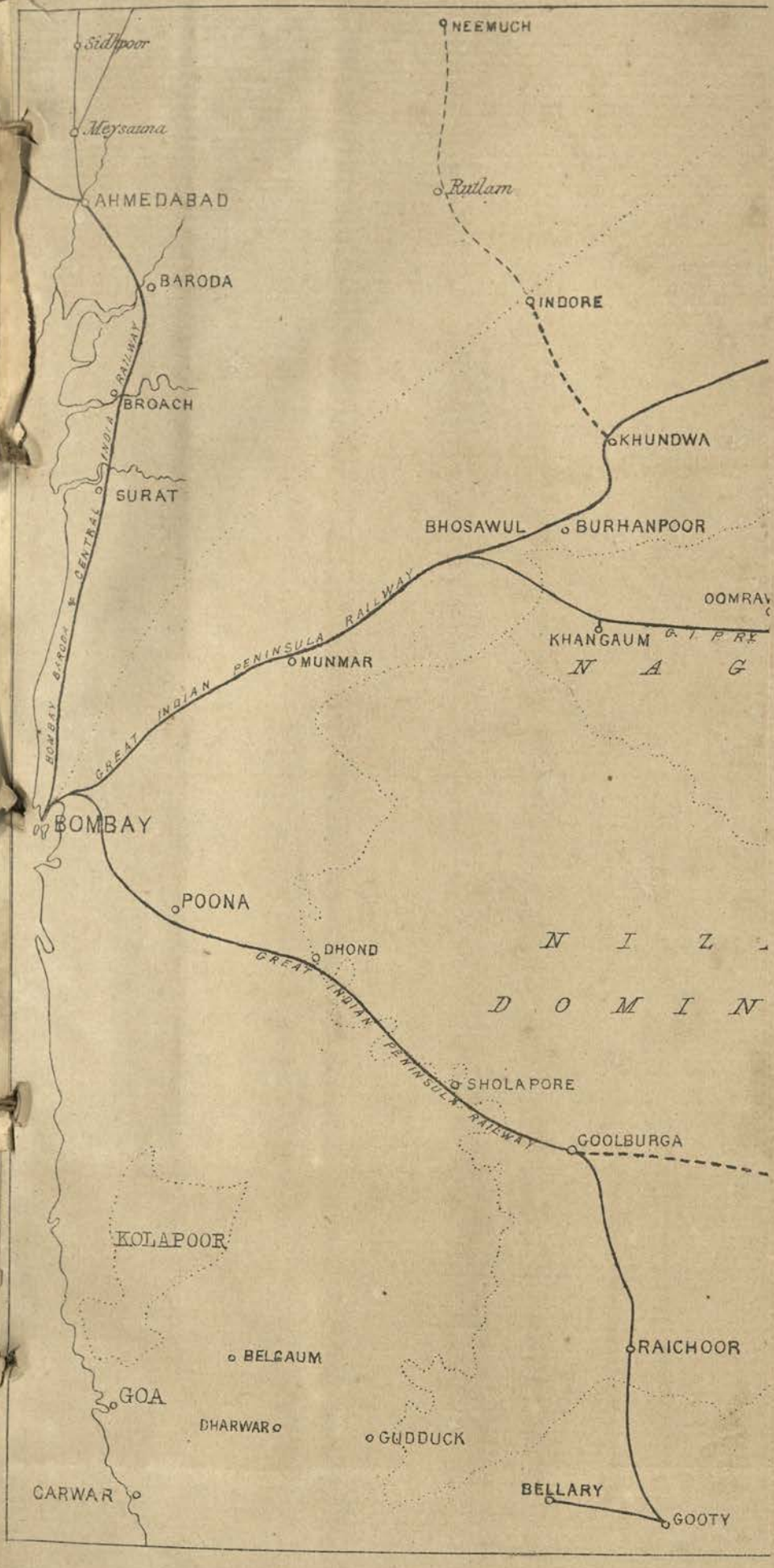
BETWEEN 73° 35′ AND 74° 49′ EAST LONGITUDE AND THE PARALLELS OF 18° 28′ AND 18° 50′ NORTH LATITUDE.



The Strata indicated thus ▬ are Basalt of various kinds, the other colored portions are various of Gneiss, Granite, Quartz, Indurated, red cellular, &c. &c.

The letters following the numbers subjoined to the names of Places denote the mode in which the heights have been obtained.
B. signifies Barometric measurement. W. calculations from the temperature of Boiling Water.

TRACING SHOWING DIRECTION OF RAIL



10.	Kanara.	The Konkan.
11.	Ratnagiri.	
12.	Kolaba.	
13.	Bombay City.	
14.	Tanna.	
15.	Surat.	Guzerat.
16.	Broach.	
17.	Kaira.	
18.	Panch Mahals.	
19.	Ahmadabad.	
20.	Karáchi.	Sind.
21.	Haidarabad.	
22.	Thar and Parkar.	
23.	Shikarpur.	
24.	Upper Sind Frontier.	

57. By thus arranging the Districts, we go from the Nerbudda to the southern limits of *our* Deccan; and then, descending to the Konkan, turn up through Guzerat and Sind to the extreme northern line of Frontier. In this way, we get the very simplest division possible—a higher, and a lower level.

58. Leaving Guzerat and Sind, for separate notice all the rest may be told off as—

1. The Table-land of the Deccan, or the higher level.
2. The Ghaut area.
3. The Konkan, or the lower level.

And the difference of elevation is well seen in the sections which accompany the late Colonel Syke's paper in the Transactions of the Geological Society, Volume IV., second series. It is explained, that these sections "represent two principal spurs from the Ghauts, and converge to the same point at the junction of the Goreh and Bheema rivers. In strictness they are not sections, ramifications of the spurs and hills at short distances north and south being inserted. They partake therefore of a slightly perspective character: but this does not affect the general correctness of their geological features. *Fig.* 1 comprises the range of hills between the Under and Bheema rivers, and has a length of about 75 miles. *Fig.* 2 shows the mountains between the Bhor Ghaut and the source of the Mota river, and extends for nearly 80 miles. The length and elevation are expressed by different scales, and from this cause the outlines of the mountains are not rigidly correct. A bare outline is traced from the Ghauts westward to the sea, for the purpose of showing the curious forms of the weathered basaltic caps and ridges of the mountains in the Konkan."

59. Other and more correct sections are those of the Railways. That over the Thull Ghaut delineates the N.E. line from Bombay to Jubbulpore, a distance of upwards of 600 miles. The branch from Bhosawul Junction to Nagpore, running E., has a length of 243 miles. The Bhor Ghaut section gives the S.E. line from Bombay to Raichore 442 miles, and there is the line to Ahmedabad 308 miles; so we get levels from the coast into the very heart of the peninsula in different directions, and along the coast into Guzerat.

60. Each of these sections is here given, and tables give the levels of the several stations. A skeleton tracing shows the general direction in which the lines extend.

GREAT INDIAN PENINSULA RAILWAY.

HEIGHT of each STATION of the RAILWAY at Rail Level, opposite Centre of Booking Office, above the Town Hall Datum, 100 feet below Bench Mark at the North end of the steps.

Mean Sea Level approximately 80 feet above Datum.

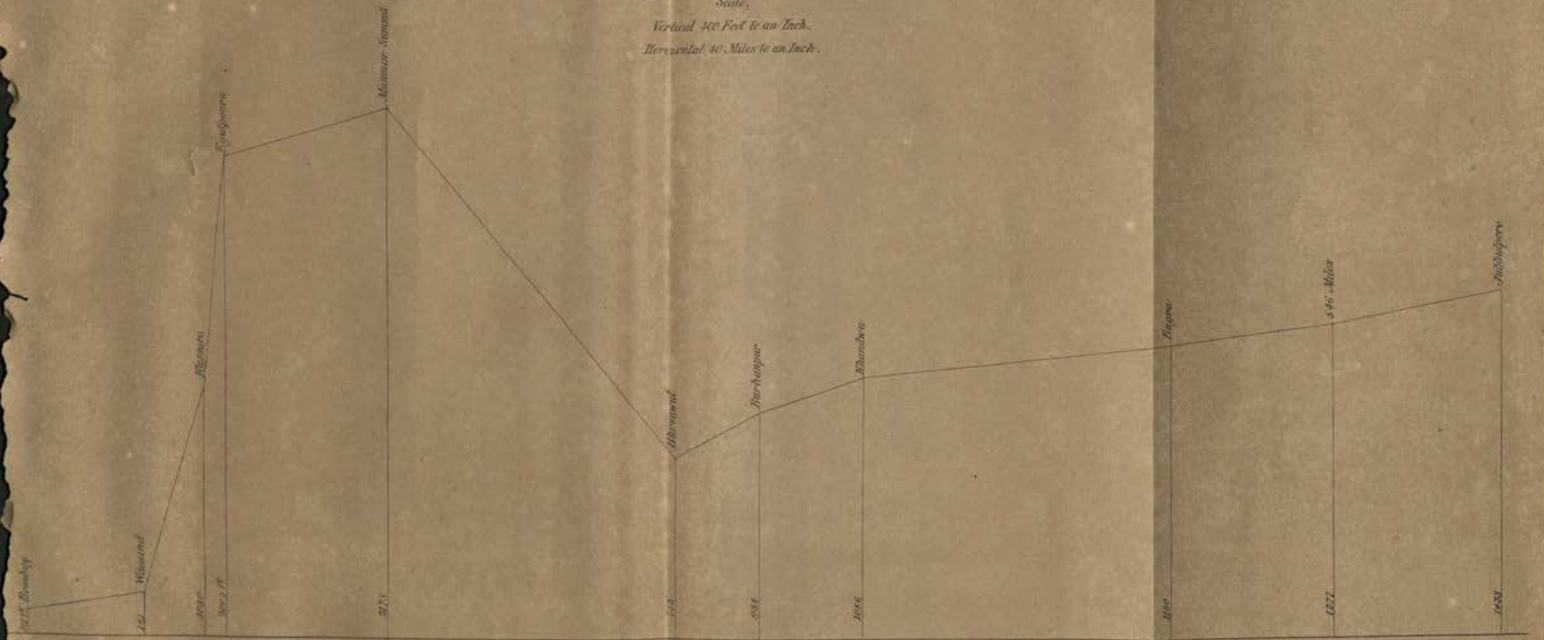
Height of Platforms above Rail Level 2·75 feet.

Distance in miles from Bombay.	Distance from Station to Station.	Names of Stations.	Height in feet of rail level above Datum.
		North-East Extension.	*Feet.*
		Boree Bunder	101·12
2¼	2¼	Byculla	93·70
5¾	3½	Mahim Dadur	91·82
8	2¼	Mahim	93·02
9¼	3½	Coorla	92·17
17¼	8	Bhandoop	95·94
20½	3¼	Tanna	105·04
33¼	12¾	Callian	106·02
40	6¾	Titwalla	135·82
49¼	9¼	Wassind	181·02
53¼	3¾	Shawpoor	324·46
59	5¾	Athgaum	556·40
63¾	7¾	Khurdee	829·86
75	8½	Kussara	1030·06
84¼	9¼	Egutpoora	2002·11
90¼	5¾	Ghotee	1976·39
100	9¾	Nandoor	1971·65
116	6	Nassick	1923·59
123	7	Kherwadee	1890·89
135½	12½	Niphar	1886·41
146	10½	Lasulgaum	2022·32
161¼	15½	Munmar	1978·11
177	17¾	Nandgaum	1632·69
189¾	10¾	Naidongree	1469·90
204	21¼	Chalisgaum	1218·87
215	11¾	Kujgaum	1046·23
231	16	Pachora	932·62
240	9¼	Myjee	872·05
247	7¼	Mussawud	797·20
260	13½	Julgaum	768·84
268¼	8¼	Nusseerabad	761·65
275¾	7½	Bhosawul Junction	756·95
286¾	11	Sowda	788·86
290¾	4	Nimbora	835·06
297¼	6½	Ravere	870·24
309½	12¼	Boorhanpoor	934·02
321½	12	Chandanee	969·35
337½	16	Dongergaum	1294·58
352½	15	Khundwa	1087·11
373½	21	Beere	1031·99
395¾	22	Kerkeam	995·37
416	20¼	Hurda	1027·05
442	26	Sewnee	1104·33
463	21	Etarsee	1149·74
479½	16½	Bagra	1181·18
494	14½	Sohagpoor	1183·44
516¼	22¼	Bunkery	1238·81

Town Hall Addis
687.237 Feet above mean Tide

N. E. LINE.

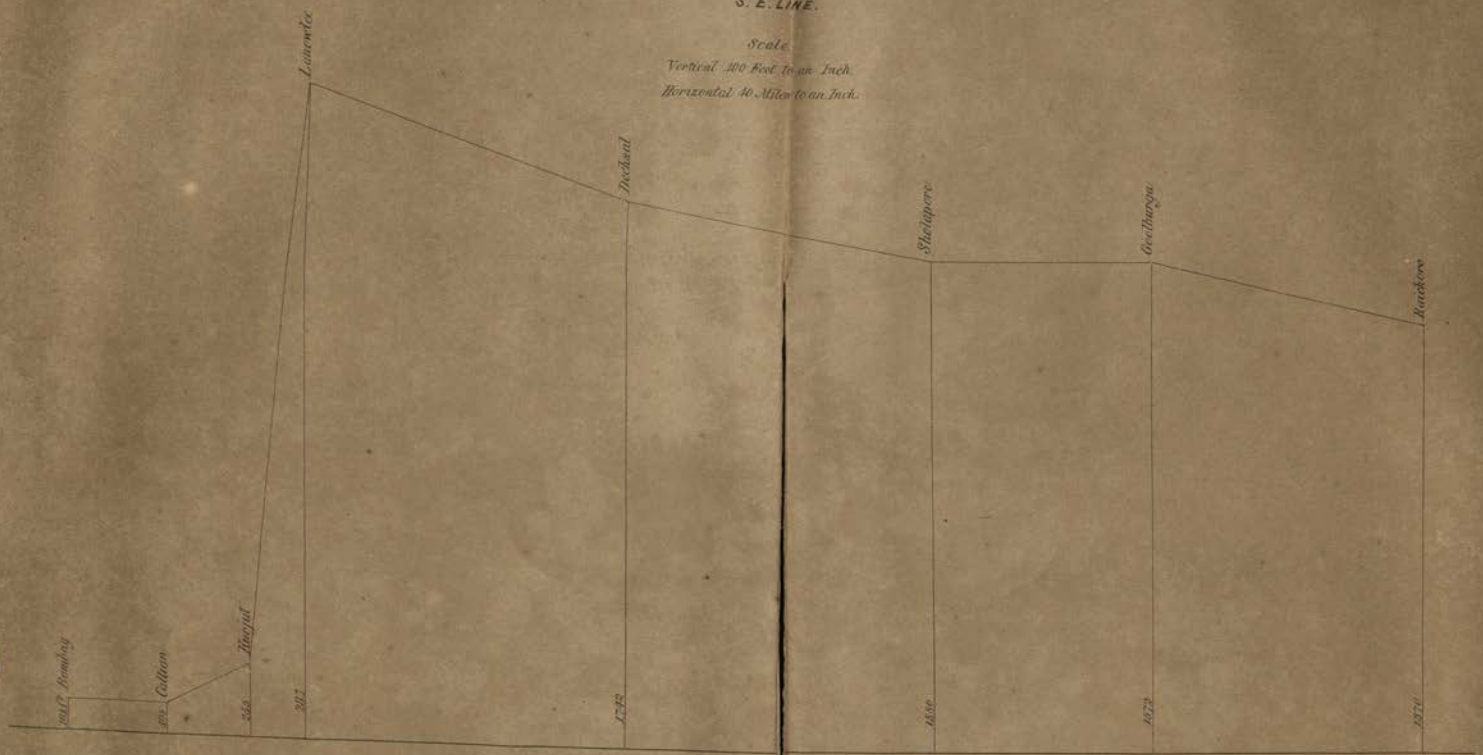
Scale,
Vertical 400 Feet to an Inch.
Horizontal 40 Miles to an Inch.



Town Hall datum
0.29 feet above mean sea level

S. E. LINE.

Scale
Vertical 100 Feet to an Inch.
Horizontal 10 Miles to an Inch.



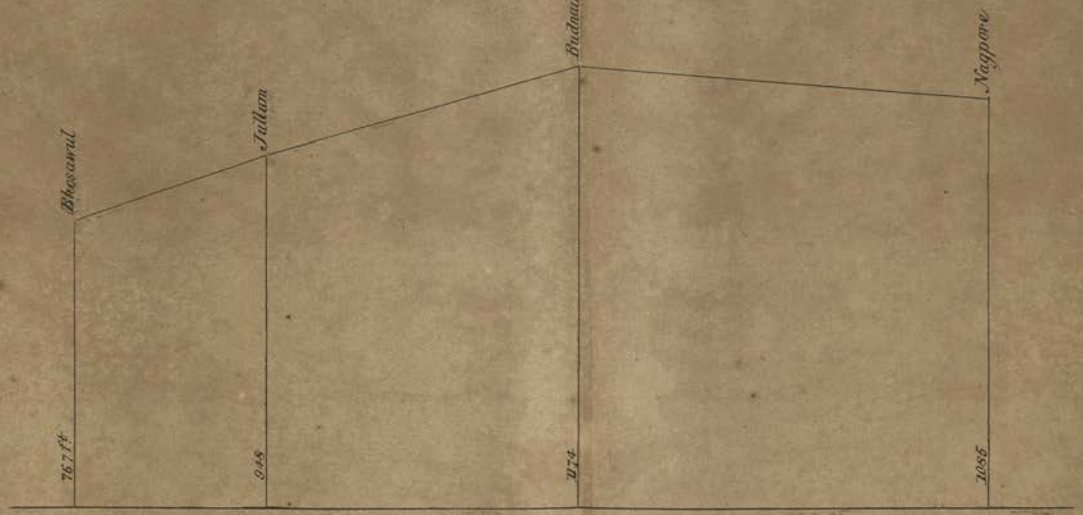
Height of Rail above Town Hall datum.

East India Press, Bombay 1872.

Town Hall datum
50.397 feet above mean sea level

NAGPORE BRANCH

Scale
Vertical 400 Feet to an Inch
Horizontal 40 Miles to an Inch



Height of Rail above Town Hall datum

Govt Central Press, Bombay 1872

Distance in miles from Bombay.	Distance from Station to Station.	Names of Stations.	Height in feet of rail level above Datum.
535¼	19	Gareewarra	1237·02
563	25	Nursingpoor	1265·05
582	19	Sindwada	1291·44
615	33	Jubbulpoor	1433·81
		Nagpoor Branch.	
283¼	8	Wurrungaum	803·42
294¼	11	Nargaum	1037·68
306½	12¼	Mulkapoor	895.94
323½	17	Neemgaum and Nandoora	945·21
339¼	15¾	Sheagaum	990·16
362¾	23	Akola	997·40
385¾	23¼	Moortizapoor...	1065·91
412	26	Budnaira	1172·94
429½	17½	Chandoor	1155·90
452¼	22¾	Kowta or Poolgaum	959·11
470¾	18½	Wurda	1010·63
490½	19¾	Sindee	881·86
502½	12	Boree	945·57
519½	17	Nagpoor	1085·89
		South-East Extension.	
33¼	...	Callian Junction	106·02
42	8¾	Budlapoor	148·24
53¾	11¼	Narel	209·56
62½	8¾	Kurjut	253·83
71	8½	Campoolee	312·75
77¼	15	Khandalla	1873·53
79¼	2½	Lanowlee	2117·72
89¼	9½	Kirkulla	2080·24
98¼	9	Tulleegaum	2105·26
108¾	10½	Chinchwud	1956·50
116	7¼	Kirkee	1919·66
119	3¾	Poonah	1899·57
137½	17¾	Ooroolee	1885·34
153¼	15¾	Keirgaum	1861·12
160	6½	Patus	1815·57
166¾	6¾	Dhond	1768·43
183½	17¾	Decksal	1742·70
195	11¾	Poemulwarree	1709·34
212¾	17¾	Jehwoor	1794·00
222¾	9¾	Keim	1865·53
234	11½	Barsee road	1762·85
243¾	9¾	Marhch	1650·52
262¼	18½	Mohul	1573·15
282¾	20¾	Sholapoor	1575·95
304¾	22	Kurrubgaum...	1560·66
321¾	17	Doodneh	1560·62
336	14¼	Goodoor	1523·08
353¾	17¾	Kulburga	1572·45
370	16	Shawbad	1390·25
385	15	Nalwar	1406·04
400½	15½	Yedagery	1278·03
414	13½	Sydapoor or Shorapoor road	1308·86
428	14¼	Indapore on Kistna	1220·06
441	13	Raichore	1395·13

Height in Feet at Rail Level above Town Hall Datum.

	Height in feet.
Top of Thull Ghaut	2002·11
Ditto Bhor Ghaut	2117·72
Bridge over Taptee near Bhosawul	764·83
Highest point between Boorhanpoor and Hurda	1325·58
Bridge over Towa river near Bagra	1176·73
Bridge over Nerbudda south of Jubbulpoor	1263·11

BOMBAY, BARODA AND CENTRAL INDIA RAILWAY.

LIST showing the Height of Rail Level at the Centre of each Station, referred to the Government Bench Mark on step of the Town Hall. Height of Platform above Rail Level, 2·75 ; height of Bottom of Girders of Over-bridges above Rail Level, 16′0″

Distance from Bombay.	Locality.	Height in feet of rail level above Datum.
	Colaba Terminus	94·00
1	Esplanade Station	94·00
2¼	Churney Road Station	94·00
3½	Bellasis Road Station	86·78
5¾	Parell Station	88·21
6¾	Elphinstone Road Crossing	89·78
7¼	Dadur Road Crossing	91·28
9	Mahim Station	89·78
10	Bandora Station	92·78
15	Andheree Station	119·98
17¾	Pahadee Station	119·68
22	Bereewlee (Dysur) Station	127·78
33	Bassein Road Station	91·78
38	Veraur Station	98·78
47½	Passing Station Soopala	98·78
57¼	Palghur Station	131·98
64¼	Boisur Station	130·78
77¼	Dhanoo Road Station	112·78
84¾	Golwud Station	115·78
93¾	Sunjan Station	134·18
100¾	Bhellar Station	185·78
107¾	Damaun Road Station	170·38
117½	Pardee Station	130·58
124¼	Bulsur Station	128·78
129¾	Doongree Station	135·78
135¼	Billimoora Station	114·78
138½	Umulsar Station	123·18
148¼	Nowsaree Station	117·78
157½	Sucheen Station	121·48
166½	Surat Station	139·78
168½	Amrolee Station	141·78
175	Sion Station	146·78
181¼	Keem Station	144·55
191	Panollee Station	176·31
197½	Unclesur Station	145·78
203	Brouch Station	136·38

Town Hall datum
98.20 Feet above mean Sea level

B. B. & C. I. R.

Section shewing height of rail level at principal Towns between Bombay & Ahmedabad.

Scale.
Horizontal 30 Miles = 1 Inch.
Vertical 200 Feet = 1 Inch.

Height of Rail on Town Hall datum.

Govt Litho Press, Bombay 1872.

Distance from Bombay.	Locality.	Height in feet of rail level above Datum.
$210\frac{3}{4}$	Chaummergaum Station	150·78
219	Palej Station	170·69
$228\frac{1}{2}$	Meagaum Station	174·78
$235\frac{1}{3}$	Etola Station	172·28
$246\frac{3}{4}$	Baroda Station	199·78
$259\frac{1}{4}$	Wassud Station	210·78
269	Anund Station	223·98
$280\frac{1}{2}$	Neriad Station	203·68
$291\frac{1}{4}$	Memoodabad Station	198·23
$298\frac{1}{2}$	Barajree Station	207·78
$309\frac{1}{4}$	Ahmadabad Station	253·78

NOTE.—Mean Sea Level approximately 80 feet above Datum.

LIST showing the Height of Rail Level at the principal Bridges.

Distance from Bombay.	Locality.	Height in feet of rail level above Datum.	
29	Bassein Bridges...	99·78	
$44\frac{1}{4}$	Veturney Do.	104·78	
93	unjun Bridge	128·58	
$105\frac{1}{2}$	Damaun Gunga Bridge	147·18	
$111\frac{1}{4}$	Koluck Do.	138·58	
$118\frac{1}{4}$	Parr Do.	138·28	
$125\frac{1}{2}$	Orunga Do.	125·78	
134	Cavery Do.	123·58	
$136\frac{1}{2}$	Umbica Do.	111·78	
$149\frac{1}{2}$	Poorna Do.	113·78	
156	Mendola Do.	114·38	
$168\frac{1}{2}$	Taptee Do.	141·78	... Near Surat.
$202\frac{1}{2}$	Nerbudda Do.	134·78	... At Broach.
258	Mhye Do.	189·78	
285	Syree Do.	191·78	
$292\frac{1}{2}$	Watruck Do.	198·78	
$294\frac{3}{4}$	Meshwa Do.	203·65	

61. THE DECCAN—the higher level—is a portion of that great table-land, itself a plateau in the descending series from the yet higher steppes of Central Asia. Its mean elevation above mean sea level is not more than about 2,000 feet. The general slope is easterly, and the whole of the drainage is carried into the Bay of Bengal by two rivers, the Godavery and the Kistna, whose outlets are only some 80 miles apart. These are the largest rivers, and they are only of the second class, but there are many smaller. The soil is the result of disintegration and deposit, and is naturally rich; but it lacks depth, and for this reason there is little or no *timber*. The scenery generally is wanting in beauty, and it would be oppressive were it not that interest is so constantly awakened by historical associations.

62. THE GHAUT AREA is the Presidency portion of the great Syhadri range. This range, touching the coast at Carwar, runs up roughly parallel to a point E. of Surat, where it turns in and forms a flanking bastion to the valley of the Taptee, where that river debouches on to the level of the littoral. It is the

sustaining wall of the plateau; and so perfect is it, that from end to end there is no natural highway through it, unless the gap of Coimbatore be so considered.

63. The western spurs are the true Ghauts or passes from the Konkan to the Deccan, and from time immemorial they have been the only lines of communication; but, except where art has improved them, they are merely tracks for pack cattle, and for these even they are extremely difficult. The eastern spurs are less abrupt, and eventually they are lost upon the plains. Their dividing valleys are the natural drainage lines, and they all trend easterly.

64. Within our limits the Ghaut area has a length of some 500 miles; its mean breadth is not perhaps more than 10 or 12, but there are spurs which run for more than 80. In the same way the mean elevation is not more than 3,000 feet, but here and there a height of 5,000 feet or more is reached.

65. This serrated line is the anticlinal axis of elevation; and here are to be seen evidences of that tremendous convulsion by which the chain was upheaved: cliff and chasm attest what a whirlwind of force was here expended: but since then old Time has moved over the scene, and the transformation is so complete, that, except to the geologist, there is nothing now to speak of volcanic agency.

66. The proximity of this area to the sea invests it with a special importance, to be noticed hereafter in connexion with climate. The formation is basalt, more or less compact, lying upon granite and capped with laterite; and the silent work of untold ages has impressed upon this tract those features so peculiar to trap formations. The weathering of the amygdaloidal layers has produced the semblance of stratification, and denudation has not only formed terraces to which the hanging gardens of old Nineveh were mere playthings, but it has clothed them with a beauty both weird and wild. Seen at their worst, there is a grandeur about the Ghauts that is irresitibly emotional; but at that season when the face of the Sun god is averted, it is a very region of enchantment with nature for the siren. The earth is then in her loveliest colours: bud and blossom are everywhere bursting into leaf and flower; the brooks run babbling of their new-found freedom; and from dizzy heights cascades leap down over moss and fern, scattering to them diamond sprays. All this too may be seen by the soft cool gray of morning, the amber sheen of glowing noon, or the purple gold of a dying day; nor is there less for the imagination. Leaving to the valley the prosaic world of to-day, one may go up and up to a fabled past. Far in the glen may be heard the roar of the torrent rushing angrily into the seething cauldron of Niflheim; high overhead the wild plantains lean over the scarps, and, stretching out their broad green leaves, wave them like Alsëids beckoning to some mystic shade. Each beetling cliff and hoary crag has its Titan fort or grim old bastion, and higher yet the fretted pinnacles of Asgard stand out in such a sky line, that the illusion is extended to their very tracery.

67. The lower level is THE KONKAN,—that region of rice and palms, with its hot glowing atmosphere so laden with moisture and so oppressive, equable as to temperature but high, so high indeed, that it would be insufferable, were it not for its redeeming feature, the sea-breeze. Whilst the length of this strip is some 500 miles, its breadth is hardly 30. Its mean elevation is not perhaps more than 100 feet; but it is full of hills, and some of them are from 1,000 feet to 2,000 feet or more above sea level. Within this area the southern limit of the trap is at Malwan, about 50 miles above Goa; and on the north it ceases in the low range of hills near Doongri, between Bulsar and Gundavi. In this tract the geological formation is everywhere similar; and, in a general way, there is the same soil, the same vegetation, and the same climate.

68. The Ghauts, on their western face, fall too abruptly to afford a gathering ground for any large rivers; nor are there any, but those of minor note are sufficiently numerous, and in ordinary seasons, under ordinary circumstances, there is no positive want of water. There is this peculiarity about the rivers: their

first course is rapid, but, opening upon the coast, they form shallow estuaries, and this sluggishness of outfall induces copious deposits. Twice every day these must be exposed, whilst over them, to the land, passes the prevailing breeze.

69. To the south of the Konkan is Kanara; but here the geological formation is different. We now come upon the coast fraction of the metamorphic area, and the physical conditions are somewhat different.

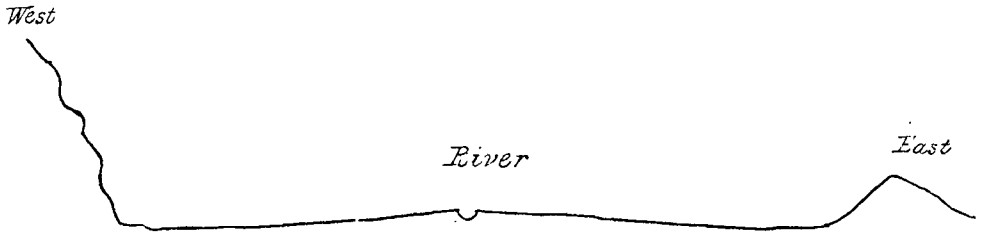
Guzerat.

70. On the north is the great plain of GUZERAT, bounded on the north and east by the slopes of the Malwa plateau, and the terminations of the Satpoora and Vindhya ranges; on the north it passes Mount Aboo, to join the plain of the Indus; and on the west are the hills of Kattywar and Kutch.

71. The length of this tract is about 250 miles, its breadth 120, and no one can tranverse it without noticing its wide-spread fertile plains, richly cultivated and dotted with villages and clumps of park-like trees, giving an idea of peace and plenty.

Sind.

72. The Province of SIND is extra tropical. From north to south its length is 300 miles, and 270 from east to west. It has an area of 52,120 square miles, and a low lying coast line of 150 miles. Throughout its length it is bisected by the *Indus*. The delta of this river is barren like that of the Nile, but from 2 to 12 miles on either side of its length is a tract of alluvial deposit, vegetable mould, clay, and sand, which is very fertile when irrigated. To the east of this tract on the left bank is the Eastern Narra, and, in the height of the inundation, it extends for some 300 miles. The country between the Indus and the Narra is from 70 to 80 miles broad, and in it are two low ranges of limestone hills, one on the north at Roree, the other on the South at Haidarabad. In its passage along the valley the Indus has gradually raised itself until it now occupies a higher level than the country on either side of it. A transverse section from the Hala range to the western desert would be much like that subjoined:—



73. Without water the country is painfully sterile, but under its influence it revels in luxuriance. The superficial soil is a foliated marl, composed of argil, or pure clay, and carbonate of lime, with a proportion of mica, in the form of fine sand. The soil on the banks of the Ganges is very similar, but in Sind there is the muriate of soda, and this apparently trifling difference gives the two countries their distinctive features. There is also the difference of physical condition which is thus noticed by Mr. Trelawney Saunders:—"The course of the GANGES runs *parallel* to the snowy mountains; it is seldom more than 200 miles from them, and is constantly receiving fresh supplies from their never-failing springs. The course of the INDUS, after it leaves the Himalaya, is *at right angles* to the face of those mountains; and the mouth of the river, together with the end of the great plain on one side of which it passes, is not less than 800 miles from the mountains. Throughout this long course it only receives one important tributary, for the 5 rivers which leave the Himalaya to supply the Indus form 3 only within 100 miles beyond the hills, and 2 only at a distance of 50 miles further. The 5 have been merged into the Indus within 250 miles of the northern hills, and the Indus alone skirts the western edge of the broad plain for the remainder of its length, about 300 miles. As the plain between the Ghara Indus and the Aravelli range is nearly 300 miles wide, and totally devoid of a permanent stream,

it is easy to understand, that the INDUS plain is a desert while the Ganges plain is abundantly watered." It is also pointed out, that the Runns of Kutch receive all the waters from the westward counter-slopes of the Ganges basin between Kattywar and the Indus; but as the rivers are not fed, like the Indus and the Ganges, by the Himalaya snows, they dry up under the fierce heat of the northern solstice, and here again there is desert. "Thus, although the Western Bunass, which washes the Cantonment of Deesa and empties itself into the Little Runn, has a course of 180 miles in length, and the Loonee, with many feeders descending from the Aravalli range, is 320 miles long, still both of them are probably dried up under the intense action of the sun of the northern solstice. Partly from the same cause a considerable area between the Loonee and the Indus is devoid of rivers."

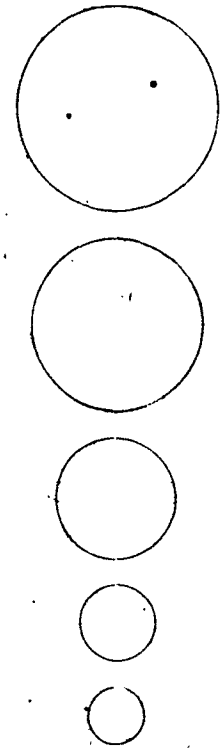
RIVER SYSTEMS.

74. The subjoined Table, by Mr. Trelawney Saunders, gives the Rivers of India, the Areas of their Basins, and the Lengths of the Main Streams.

	Area in English Square Miles.	Length in English Statute Miles.
Ganges	391,100	1,514
*Indus	372,700	1,800
Bramaputra	361,200	1,800
Irawaddy	150,800	1,060
Godavery	112,200	898
Kistna	94,500	800
*Thurr Desert	68,700	.....
Salween	62,700	750
Mahanuddy	43,800	520
*Western Ghauts, West Coast Basins	41,700	.....
*Nerbudda	36,400	801
Aracan Basins	29,700	.....
Cauvery	27,700	472
*Kattywar and Cutch Peninsulas	27,600	.....
*Taptee	27,000	441
*Loonee	22,400	320
Orissa Coast Basins	22,200	.....
Pennaur	20,500	355
Sittang	18,300	230
*Myhee	15,500	350
Braminee	15,400	410
Tenasserim Coast Basins	14,200	.....
Byturnee	11,900	345
Subunrika	11,300	317
Gundlagunga, &c. Coromandel Coast	10,300	.....
Vigay	9,800	130
*Sabermuttee	9,500	200
Pulicat L., &c	6,700	.....
Palar	6,300	220
*Western Bunass	6,300	180
Penar	6,200	245
Vellaur	4,500	.....
Vypar	3,900	.....
Tamberpurney	3,600	80
L Colair, &c.	3,100	.....
*Dhadur	1,800	.....
Total Area of the Indian Basins	2,071,500	
Basins of the Bay of Bengal	1,441,900	
*Indian Basins of the Arabian Sea	629,600	

75. A good idea of these enormous areas is obtained by showing them relatively with those of well known countries, thus—

	Square Miles.
Total area of Indian Basins	2,071,500
Basins of the Bay of Bengal	1,441,900
Indian Basins of the Arabian Sea	629,600
Area of France	201,900
Combined area of England and Wales, Scotland and Ireland	120,879



The size of each area is here represented by a circle, and it will be seen at a glance how great is the difference between that of England—Great Britain rather—and India.

76. The areas with which we are more immediately concerned are those draining into the Arabian Sea, as follows:—

	Square Miles.
Indus	372,700
Thur Desert...	68,700
Kutch and Kattywar	27,600
Western Bunass	6,300
Loonee	22,400
Saburmuttee	9,500
Mhye	15,500
Dhadur	1,800
Nerbudda	36,400
Taptee	27,000
Western Ghauts, West-Coast Basins ...	41,700
Total.....	629,600

77. It will be seen that, out of the 629,600 square miles, no less than 436,100 are drained by three rivers—the Indus, the Nerbudda, and the Taptee; and that more than half is drained by the Indus alone. For the entire Presidency there are but 5 main rivers:—

Indus	1,300 Miles in length.
Nerbudda	301 „
Taptee	441 „
Godavery	898 „
Kistna	800 „

78. For Sind there is but one—the INDUS—and, rising high up amongst the perpetual snows of the Himalaya, it draws from them sufficient strength to run, without one single feeder, across a plain 300 miles in length, turning it from an oppressive desert into a teeming garden. Crossing the Thur, without a stream, and passing by Kutch and Kattywar, as non-registration districts, we come to the plain of Guzerat. The south west slopes of the Aravalli range are drained by the western Bunass, the Loonee, and the Saburmuttee. The Mhye drains the south west slopes of the Malwa plateau, and the Dhadur drains the western extremity of the Vindhya range. These streams rise at no great heights, and they are so absorbed by the parched up plain, that it can hardly be said they are perennial.

79. Between the Vindhya and Satpoora ranges is the NERBUDDA, and an excellent account of its valley is given in the Bombay Government Records No. XIV., new series. From this compilation it appears that, for several hundred miles, this much-lauded valley is, in detached portions, a barren, hilly, and uncultivable jungle. The great agricultural districts lie north of its upper portion, and the chief mineral ones stretch over the south bank of one of its central basins, from 250 to 500 miles from the sea. Its free navigation all the year round hardly extends beyond its limited tide-way of some 25 miles. From its source to its mouth it is closely bounded on both banks by the two ranges of hills which cross Central India, and which have elevated spots such as Amirkuntuk 5,000 feet, Pachmurree 3,000 feet, Mainput 2,700 feet, Jam Ghaut 2,000 feet. The average distance between these ranges is from 18 to 20 miles, and nowhere are they 40 miles apart. In its upper portion from Mandla, and almost from Amirkuntuk to Jubbulpore, in the centre from just below Hindea to Burwai, and lower down from Hurun Pul to Mokree, the hills almost form the banks. The declivity and principal watershed is to the north, the tributaries are the drainage of the ranges, and they sometimes flush the river so rapidly, that it rises 70 and 90 feet in a few hours. The source is in the high plateau near Amirkuntuk, and for 750 miles the course is westerly. It is through a hilly tract, and is more of a longitudinal cleft than a distinct valley. From Jhansee Ghaut, near Jubbulpore, to the sea, the fall is 1,200′ in 500 miles. Its lower portion from Tullukwarra to the sea is 60 to 80 miles long, and it is more level, but in this short distance even there are rapids. Were the descent direct and gradual, it would involve a fall of 6′-75 per mile. The Godavery is 2′; the Amazon, 700 miles from the sea, is 0′02. The Ganges, 800 miles from its source, is 1′. A fall of 12″ per mile is equal to a current of 1 mile per hour; so the Nerbudda has an estimated flow of 7 miles per hour. Within the first 250 miles the descent is over 3,000 feet. The bed is all basalt, upheaved in diagonal ridges running north, east, and south-west about 150 yards wide. The upper basin is nearly 200 miles in length, and 1,000′ above sea level; it extends from the marble banks of Beira Ghaut, opposite Jubbulpore, to a little below Hindea. The lower is about 100 miles long, and from 500′ to 700′ above sea level. It runs from the quartz hills above Burwai to Chikulda, and is more open. The banks of both basins are some 40′ high, the soil is alluvial, marl and clay below, black vegetable mould above. The upper basin is so level that, from Jubbulpore to Hoshungabad, upwards of 250 miles, the fall is little more than 50.′ In the lower basin it averages 200.′ The centre is nearly 400′ below the centre of the upper basin, Hoshungabad being 1070′ above sea level, and Mundlaisur 700.′ In the third or inferior portion, 100 miles lower down, Tullukwarra is 450′ below Mundlaisur. The valley of the Nerbudda is conterminous with that of the Soane, an affluent of the Ganges, and in this way it connects the lowland of the west with the plain of Bengal.

80. THE TAPTEE rises in the Satpooras, and drains their southern slopes. It divides them from the northern Ghauts, and its basin separates those of the Nerbudda and the Godavery. It has a total length of 441 miles and is navigable

up to Surat, but boats can go up as far as its confluence with the Poorna, about 250 miles from the sea.

81. The Godavery rises at Trimbuk, some 18 miles from Nasik. It may be taken with the Kistna, which rises in the western Ghauts at Mahableshwur. The basins of these two rivers extend for 700 miles from north to south, and 500 miles from east to west. With their own affluents and the Pennaur they drain the whole of the country lying within the northern, western, and eastern Ghauts as far south as Madras, an area more than twice that of Great Britain. The affluents of these rivers are, many of them, fine streams, watering large tracts of country: such are the Koina and Yena, the Bheema, Goreh, Mota, Moola, Neera, Under and others. Further south are the Gatpurba, with the celebrated falls of Gokak, the Malpurba and the Toongabudra. In the Konkan there are no rivers of any note, but there are numerous streams which serve their purpose.

CLIMATE.

82. Under this head, it will be better to take the geographical divisions separately; and, it must be remembered, that collectively they extend through some 14 degrees of latitude and 10 of longitude—that one portion is without the Tropics, that another is a mere strip of coast, whilst a third is a high lying table-land. Bearing this in mind, it is clear that there must be wide differences in all pertaining to climate; but, unfortunately, except as they are evident to the senses, there are no very ready means of saying what these differences are. Desultory notes have been made at various times, and in many places, and in themselves they are invaluable; but, except for Bombay itself, there is no available *series* of observations on pressure, and temperature, humidity, wind, rainfall, electrical condition, &c., &c. If in meteorological elements there are degrees of importance, the most important, as regards health, is the *average daily range of temperature;* and of this we really know very little; for if the necessary facts have been recorded, and this even is doubtful, very certain is it, that neither for the several Districts nor the Presidency have they yet been tabulated.

83. In Sind, which is without the Tropics, the climate of the upper portion differs from that of the lower, and each must be considered by itself; but, for the Province generally, the distinguishing characteristics are extreme dryness, and a rainfall so scanty as to be almost inappreciable. For the ten years ending with 1871 the average annual fall was only 3 inches. Here, as in Egypt, the great river is all and everything. Its inundation is the rain equivalent; but it brings with it a maximum of saturation, and this it is that in Upper Sind makes the hot weather so very trying. Without reference to registered temperatures, the year in the Shikarpoor and Frontier Districts has but two seasons, a cold and a hot; but in the latter there are degrees of intensity which, in a measure, sub-divide it. The cold season lasts from the last week in November to the end of March; and it is more bracing, and more enjoyable, than that in any other part of the Presidency. The hot weather is more or less continued from April until well into November; but for April, October, and the portion of November there is nothing much to complain of. From May to September there is a heat so intense, and so oppressive, as to be almost beyond endurance. It can hardly be described, but perhaps an idea of what it is may be gathered from the subjoined Table, given by the late Dr. Lalor in his report on Jacobabad:—

METEOROLOGICAL REGISTER kept at Jacobabad for June and July 1860.

1860.	Maximum.	Minimum.	Daily range.	1860.	Maximum.	Minimum.	Daily range.
June				July.			
1	Fahr. 102°	Fahr. 93°	Fahr. 9°	1	Fahr. 103°	Fahr. 89°	Fahr. 14°
2	102	89	13	2	102	91	11
3	102	83	19	3	109	91	18
4	104	84	20	4	105	91	14
5	104	84	20	5	105	90	15
6	102	85	17	6	105	90	15
7	104	85	19	7	104	91	13
8	104	85	19	8	105	91	14
9	105	89	16	9	103	91	12
10	104	89	15	10	101	90	11
11	104	88	16	11	101	91	10
12	104	90	14	12	100	90	10
13	102	92	10	13	104	90	14
14	102	85	17	14	104	90	14
15	102	85	17	15	103	90	13
16	102	85	17	16	100	90	10
17	102	87	15	17	100	90	10
18	102	87	15	18	100	90	10
19	102	89	13	19	102	92	10
20	102	86	16	20	102	91	11
21	102	90	12	21	103	91	12
22	102	90	12	22	104	91	13
23	109	90	19	23	100	90	10
24	110	92	18	24	100	88	12
25	110	92	18	25	101	91	10
26	110	93	17	26	106	92	14
27	99	90	9	27	100	92	8
28	99	90	9	28	101	89	12
29	100	90	10	29	90	83	7
30	104	91	13	30	93	88	5
				31	94	88	6
Means.	103·4	88·3	15·1	.....	101·6	90·1	11·5

84. The above gives a true picture of Upper Sind during its hot weather. For two months the mean of the maxima 102·6° and of the minima 89·2°, whilst the daily range was as high as 20° with a mean of 13·3°; and this at Jacobabad, with its miles of trees, its gardens and canals. A glimpse of a less favoured locality is given by Dr. Lalor, in his observations at Mehur, some 60 or 70 miles farther south, and only a few miles west of the Indus :—

RANGE of the THERMOMETER at MEHUR.

1860.	In the shade.	In the sun.			
	Noon.	1 P.M.	2 P.M.	3 P.M.	4 P.M.
July 16	99° Fahr.	153° Fahr.	150° Fahr.	140° Fahr.	.....
„ 17	90	150	147	136	120° Fahr.
„ 20	104	153	145	131	125
„ 21	103	157	148	122	120
Means.	99·	153·	147·	132·	121·

85. Such readings as these are not often taken; but I may add, that at midnight I once saw the dry and wet bulbs both standing at 110° Fahr. Leaving the river, and crossing the frontier into Cutchee, it is yet worse. Witness Dr. Cook's readings *in the shade* on his march to Kelat *vid* the BOLAN PASS in May 1859:—

Dadur (mean of 18 days)	115°	Fahr.
Kondilani	117	,,
Kirta	121	,,
Bebee Nani	122	,,
Abigoom	108	,,
Sir-i-Bolan	101	,,
Mean...	114	

Witness, too, the shade readings during my march to Kelat *vid* the GUNDAVA PASS, in July and August 1864:—

NOON Readings on march from JACOBABAD *to* KELAT.

1864.	Stations.	Negretti's Mt. Barometer. Reading.	Attached Thermometer Fahr.	Corrected for capillarity and to 32° Fahr.	Maximum Fahr.	Wind.	Instruments in a Hill Tent.
July 21	Burshoree ...	29,360	103·5	29,188	112°	Ely. 2 Hot.	Heavy dust storm from E. at 3 P.M. followed by rain.
23	Oodana ...	29,300	107	29,117	112	,,	114 in Bechobah, 128 in sun.
24	Gundava ...	29,020	105·5	28,843	110	,,	Heavy storm last night at 11, with rain.
25	Gundava ...	29,185	88	29,051	92	,,	
26	Kotree ...	29,166	102	28,996	104	,,	
27	Peer Chuttur...	28,786	101	28,622	103	,,	
28	Kahoo ...	28,500	101	28,336	105	,,	Last night was terribly oppressive.
29	Paneewut ...	28,280	100	28,122	102·5	,,	
30	Hatachee ...	27,800	96·5	27,655	98	,,	
31	Peer Lukka ...	27,250	101	27,096	102	,,	Slight shower at 5 P. M.
August 1	Munealo ...	26,740	104	26,589	107	Wly. 4 Hot.	
2	Paisht Khana .	26,288	103·5	26,136	106	,,	
3	Goram Bawud .	25,750	104	25,599	104	,,	
4	Peesee Bent ...	25,200	99	25,063	99	,,	
5	Jung-i-Jah ...	24,500	96	24,373	98	,,	
6	Anjeera ...	24,194	92	24,178	94	,,	
7	Sohrab ...	24,050	89	23,941	91	,,	
8	Sohrab ...	24,051	90	23,940	91	,,	
9	Soormasing ...	23,830	89	23,723	93	,,	
10	Rodinjo ...	23,536	86	23,436	91·5	,,	
11	Kelat ...	23,342	80	23,256	81	,,	Instruments in an open garden house, well shaded.
MEANS.			97		99		

There was a marked change after the heavy storm at Gundava. It was still very hot, but there was not that feeling of oppression. The first real change, for the better, was at Peesee Bent.

No observation was taken on the 22nd, as there was a heavy storm over by the Zeen; and it threatened us, so the instruments were packed.

86. I ought perhaps to say, that we reached Kelat just before the hot season ended. The observations were continued during our stay, and the following were the means:—

	August 18th to 31st.	September 1st to 30th
Mt. Barometer corrected ...	23·633	23·677
Dry bulb Fahr.	78·8	55·8
Wet	57·2	52·3
Dew point...	42·1	36·6

When we left on the 6th October we were fairly driven out by the cold, the people had themselves begun to migrate. More than once the thermometer fell to 27, and the wet bulb used to be frozen till after 8 o'clock. The cold on these mountains is unusually severe, and on one occasion I registered 17° Fahr. It was at an elevation of about 6,000 feet at Dhar Yaroo, on the Hala Range W. of Larkhana, on the 8th October 1863, and the instrument was a Negretti and Zambra, self-registering spirit minimum. On the previous evening it was placed with its fellow, a mercury maximum, on the grass, and at 6 o'clock they were reading maximum 54° minimum 47°. At 6 the next morning they were 21 and 17. In 12 hours the one had fallen 33° the other 30.° A wet bulb alongside was, with its well, a block of ice; and there was ice everywhere, but no hoar frost. Nor is this cold confined to the hills; for I have registered 27 Fahr. on the plain, and frosts are not uncommon at Jacobabad.

87. In lower Sind both heat and cold are by comparison less severe, and the sea-breeze is said to extend an influence as far as Sehwan. In coming down the river, in the hot season, the change for the better is very perceptible when this place is passed. Dr. Blanc made a series of observations at Ghizree Sanitarium during 1862, and, with modifications, they apply to the coast area. The following are his results:—

Mean Temperature for the year ...	79° Fahr.		
Maximum—on September 20th ...	101	„	
Minimum—on January 17th	56	„	
Greatest diurnal range—on February 19 No.	19	„	
Close and oppressive days	„	10	
Close nights	„	3	
Sand storms	„	9	
Locust storms	„	6	
		Inches.	Cents.
Days of rain	„	22 =	5 27
Morning fogs	„	9	

Prevailing Winds	S.W.	N.E.	W.	E.	N.	N.W.	S.E.
	147	107	77	15	11	4	4

88. Dr. Blanc describes the climate week by week, and month by month; and from these remarks* a fair idea may be formed of it. He divides the year into three seasons of four months each, as follows:—

*See opposite page.

1. *Cold and Dry*, from last week of November to end of March.
2. *Monsoon or Temperate*, from last week of May to third week of September.
3. *Intermediate or Variable*, from end of March to end of May, and from last week of September to last week of November.

His comparative table of means is the following:—

From hospital.	Seasons.								
	Cold.			Monsoon.			Variable.		
	Maximum	Minimum.	Mean.	Maximum	Minimum.	Mean.	Maximum	Minimum.	Mean.
For seven years ending with 1861	83°	56°	70°	92°	81°	86°	106°	60°	80°
1862 ...	84°	51°	66°	89°	79°	84°	95°	63°	79°

Months.	Weeks.	Rain-fall.	Prevailing Winds.	Atmospheric Variations.
January.	1		N. E.	Clear, cool, pleasant. Nights cold.
	2		NE. W.	Clear. Altogether colder.
	3		NE. W.	Cloudy, cold. Fall of rain.
	4	·52	N. NE.	Cloudy, cold, and pleasant.
February	5		NE. W.	Cloudy, cold. Two slight showers.
	6		SW. NE.	Clear, cool, and agreeable.
	7		SW. NE.	Clear and cloudy. Days warmer, nights cold, dew.
	8		SW. NE.	Very damp, temperate. Nights cold.
March.	9		W.	Cloudy, temperate. Nights cool and dewy.
	10		SW. NE.	Clear and pleasant. Mornings foggy.
	11		NE. SW.	Cloudy, cool, pleasant. Heavy dew at night.
	12		W. NE.	Very variable and unpleasant weather.
	13		SW. W. NE.	Very variable, decidedly warmer, some close days.
April.	14		SW.	Cool and pleasant. Cloudy. Lightning.
	15		SW.	Cool and pleasant, owing to strong sea-breeze.
	16		SW.	Cloudy, cool, and pleasant.
	17		SW.	Variable, morning and evening hardly any wind. Strong breeze in day time. Heavy dew at night.
May.	18		NE. SW.	Variable, occasionally warm and oppressive fogs.
	19		NE. SW.	Cloudy, close, oppressive. Hot land winds, dew.
	20		W. NE. SW.	Variable, cool in the day time, occasionally hot. Winds mornings and evenings.
	21		S. W.	Cloudy, warm, but tempered by sea-breeze.
June.	22		SW. W.	Warm, mornings and evenings pleasant. Nights cool.
	23		SW. W.	Warm, cloudy, rendered pleasant by sea-breeze.
	24		S. W.	Cloudy, damp, some close nights, owing to the sea-breeze dying away in the evening.
	25	·4	W. SW. NE.	Variable, very close, a dust storm and a thunder storm, which cooled the atmosphere.
	26		S. W.	Cloudy, rendered temperate by sea-breeze.
July.	27	1·8	N. W. SW. W.	Cloudy, close, oppressive, first part of the week, cooled by a thunder storm
	28		SW. Moderate.	Warm, a few close nights, owing to the sea-breeze being very moderate all the week.
	29		S. W. Strong	Cloudy, warm, but rendered pleasant by sea-breeze.
	30		SW.	Cloudy, warm but rendered pleasant by a strong sea-breeze.
August.	31	1·50	W. SW.	Cloudy, stormy. Cool and pleasant.
	32		SW.	Cloudy, cool, and pleasant.
	33		W. SW.	Clear, afterwards cloudy and stormy. Cool and pleasant.
	34		SW.	Cloudy. Very pleasant weather.
September.	35		W. SW.	Cloudy. Cool and pleasant.
	36		W. SW.	Clear and warm, afterwards cloudy and cool.
	37		W. SW.	Generally pleasant. Cloudy or clear.
	38	·12	SW. NE.	Cloudy, warm, heavy dew at nights.
	39	·30	N. N. E. SW.	Variable, close and oppressive, stormy, with slight fall of rain and more temperate.
October.	40	·32	W. SW.	Variable, with occasional showers.
	41		W. SW.	Cloudy, cool and pleasant, nights getting cold.
	42		S. SW.	Clear, cool and pleasant.
	43		NE. SW.	Variable, nights dewy, morning fogs.
November.	44		NE. SW.	Mornings and evenings very cool and pleasant.
	45		NE. SW.	Very variable weather.
	46		NE. S.W.	Cool and pleasant. Nights cold and dewy.
	47		NE.	Cool and pleasant.
December.	48	·31	{ N.E. Night. SW. Day. }	Variable, a sand storm and a slight fall of rain.
	49		NE.	Very pleasant, clear, nights cold.
	50		NE.	Very pleasant, clear, dew at night.
	51		NE.	Fine and pleasant, clear.
	52		NE.	Cold and pleasant, a slight sand storm.

89. In GUZERAT the climate in the north differs somewhat from that in the south. Between the western Bunass and the Saburmuttee the hills are distant; there are wide stretches of sand, the country is more open, and but poorly watered; and, as might be expected, the heat is drier, the rainfall less. Between the Saburmuttee and the Nerbudda there are increasing streams, a richer soil, better trees, and more cultivation; and in this tract, although the actual heat is not greater, it is more oppressive, for there is more humidity. From the Nerbudda to the Taptee, and again from that river to the Damaun Gunga, there is the influence of the sea-breeze, and the climate generally is more like that of the upper Konkan. Taking as representative points of observation Deesa, Ahmedabad, Kaira, Broach, and Surat, the following are the means of ten years' tables:—

Stations.	Mean Annual Temperature Fahrenheit 1852 to 1861.		Mean Range.	Average Rainfall 1862 to 1871.
	Maximum.	Minimum.		
Deesa	93·10	68·30	24·80	.....
Ahmedabad	93 88	71·53	22·35	22·89
Kaira	92·43	70·17	22·26	27·45
Broach	94·85	74·50	20·35	27·47
Surat	91·93	72·41	19·52	46·26
Means for entire Province ...	92·43	71·98	21·85	31·01

At Deesa on the 28th July 1859 there was a rainfall of 6 inches during the night, and on the 10th August 1868 at Baroda 12·09 inches were guaged.

90. In the KONKAN the distinctive features of the climate are great humidity, high temperature, and heavy rainfall. The tables by Mr. Chambers, F.R.S., give the results of all the meteorological observations at the Colaba Observatory from 1865 to 1870, both years inclusive; and with modifications they may be accepted as expressing the values for the coast line generally, if not for the Konkan; so I propose to take from them the more prominent facts connected with atmospheric pressure, temperature, wind, and rainfall. Now, in these tables the mean for a day represents the sum of the hourly observations divided *by twenty-four*; so their value is the highest obtainable, and it is worth while to examine them at some length.

91. Although there is a direct relation between atmospheric pressure and temperature, the variations of the former are not so immediately cognisable to the senses, as are the alternations of the latter; nor do they, perhaps on this account, excite the same general interest; they are little thought of, and less understood. If the periodical variations for Bombay be projected, they give minima at about 3 A.M. and 4 P.M., and maxima about 9 A.M. and 10 P.M.—the corresponding extremes of temperature being at about 6 A.M. and 2 P.M.—and the curves have the uniformity that is peculiar to the tropics. In the subjoined table there are shown the monthly and annual means for each of the six years above mentioned.

MEAN readings of the Standard Barometer at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Means.
1865 ...	29·972	29·910	29·874	29·800	29·741	29·669	29·656	29·666	29·788	29·848	29·890	29·918	29·811
1866 ...	·959	·905	·867	·816	·775	·675	·661	·706	·795	·808	·927	·969	29·822
1867 ...	·965	·916	·879	·819	·734	·671	·667	·692	·750	·826	.983	·981	29·824
1868 ...	·937	·921	·881	·831	·796	·673	·699	·742	·817	·857	·920	·963	29·836
1869 ...	·966	·936	·879	·821	·773	·659	·668	·705	·730	·824	·908	·904	29·814
1870 ...	·879	·877	·836	·795	·764	·651	·637	·724	·754	·807	·900	·936	29·797
Means ...	29·946	29·911	29·869	29·814	29·764	29·666	29·665	29·706	29·772	29·828	29·921	29·945	29·817

Cistern of Barometer 37 feet above mean sea level.

92. The period of least pressure is well marked, and corresponds to the season of rain and storm; and, in the table for range, it will be seen that the greatest mean range is during the unsettled weather which ushers in the monsoon:—

EXTREME Ranges of the Standard Barometer at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Means.
1865	0·275	0·252	0·249	0·343	0·332	0·273	0·384	0·29	0·331	0·264	0·362	0·268	0·299
1866	·261	·274	·355	·273	·196	·568	·322	·373	·236	·374	·226	·382	·320
1867	·215	·259	·277	·268	·218	·341	.324	·234	·360	·261	·324	·227	·276
1868	·283	·328	·245	·348	·352	·487	·307	·359	·227	·225	·350	·302	·318
1869	·315	·233	·247	·316	·313	411	·325	·250	·352	·303	·277	·271	·301
1870	·211	·266	·297	·286	·301	·432	·219	·194	·409	·378	·341	·336	·306
Means ...	0·260	·269	·278	·306	·285	·419	·313	·278	·319	·301	·313	·298	·303

Cistern of Barometer 37 feet above mean sea level.

93. As regards TEMPERATURE, our first table must be one showing the average for each month of the year, and the annual mean for each of the six years noted:—

MEAN Readings of the Dry Bulb Thermometer at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Means.
1865 ...	76·6	76·3	78·8	84·2	86·9	84·7	82·1	79·6	80·5	80·2	78·0	76·3	80·3
1866 ...	72·9	71·8	77·2	79·2	82·7	82·7	79·6	79·2	80·0	81·4	77·8	75·4	78·3
1867 ...	74·2	73·1	76·9	80·6	84·7	84·7	80·5	79·7	79·6	79·9	76·6	74·9	78·7
1868 ...	72·9	74·8	76·6	81·6	84·5	83·2	80·2	79·6	80·0	81·3	78·8	75·7	79·1
1869 ...	75·3	75·7	77·9	82·0	84·1	83·9	82·1	80·8	79·8	80·2	79·1	77·5	79·6
1870 ...	73·6	75·6	78·8	81·2	83·7	82·7	79·4	79·4	79·3	79·5	79·0	76·3	79·0
Means. ...	74·2	74·5	77·7	81·4	84.4	83·6	80·6	79·7	79·8	80·4	78·3	76·0	79·2

Fahrenheit's Scale.

94. Now, in this table we see that, for what we call our cold weather,—December, January, and February,—there is a mean temperature of 74·9°; and during this time it is really pleasant, with sometimes a feeling of positive cold.

March is a transition month; it is not unpleasant, but the mean temperature has risen from 74·5° to 77·7°. April and May are unmistakably hot, and in May especially the calms are terribly oppressive; the mean temperature reaches 83·9°. From June to November inclusive the heat is continued and great, though tempered at times by high wind and rain. The mean temperature is 80·4°, and it is very trying when shut off from the breeze, or in the intervals between the squalls; indeed, this remark applies to the weather during all the months, except December, January, and February. The minimum seldom falls below 60° or 57°, and for the coldest day we can boast of during six years—February 9th 1866—the mean for the 24 hours was only 65·3°. A more practical way of illustrating the condition, is to show the mean temperature for each month in Bombay and in England. The Bombay means are for six years, from 1865 to 1870, at Colaba, and the English are for thirty-five, from 1815 to 1849, at Greenwich :—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Means.
Bombay ...	74·2	74·5	77·7	81·4	83·9	83·6	80·6	79·7	79·8	80·4	78·3	76·0	79·2
Greenwich ...	36·1	38·7	42·0	46·7	53·7	59·7	62·4	61·9	57·3	50·4	43·6	39·4	49·1
Difference ...	38·1	35·8	35·7	34·7	30·2	23·9	18·2	17·8	22·5	30·0	34·7	36·6	30·1

Fahrenheit's Scale.

95. It will be seen that, whilst the Bombay table is no where below 74°, the English one never touches 63°: the greatest difference between them being 38·1 in January, the least 17·8° in August. But these, be it remembered, are *mean* temperatures; for in England even it is sometimes intensely hot, as well as bitterly cold. At Greenwich it has been 95° in the shade, and in Scotland, during the great frost of 1860, two thermometers, one exposed the other protected, registered—20° and—12° respectively. After such extremes, it may seem absurd to speak of cold in Bombay; but to the native born and bred in a mean temperature of 80°, a depression of 20° is sensible and real; more so, perhaps, than is northern cold to the hardy Scot. There is only a difference of some six degrees between the means of our hot and cold weather; between the former and the monsoon months there is no appreciable registered difference, and then, until the cold weather again comes round, it is only two degrees lower. So at best we know only two seasons: a short one of comparative cold, and a long one of heat, diversified for 3 months by a deluge of rain. These results are best seen by tabulating them with those for the well-known English seasons :—

England.			Bombay.	
Mean Temperatures.	Seasons.		Seasons.	Mean Temperatures.
38·0°	... Winter ...	December, January, February	Cold ...	74·93°
47·4	... Spring ...	March, April, May... ...	Hot ...	81·02
61·3	... Summer ...	June, July, August ...	Wet ...	81·50
50·4	... Autumn ...	SeptemberOctoberNovember	Hot ...	79·55
Mean 49·2	..			79·25 Mean

96. As pointed out by Mr. Buchan, it must not be forgotten that *mean temperature* is a composite element; and, in considering its relations to health or to agriculture, it is most essential to know the separate elements which compose it. Made up of the mean temperatures of the day and night, the same mean often

stands for two things essentially different. "Thus, Madrid in the centre of Spain, and Mentone in the Gulf of Genoa, had the same mean temperature of 72·8° during September 1865 ; but the climates of the two places were widely different, for the temperature at Madrid during the warmest period of the day was on an average 86·2°, whereas at Mentone it was only 77·6°; and during the coldest period of the night the temperature was 59·5° at Madrid, whilst at Mentone it was as high as 68°." In Bombay also during the monsoon the mean temperature is the same as that for the three preceding months ; but the climate for the two periods is very different.

97. Having seen what is the mean temperature month by month, and what are the differences between our seasons, it remains to see what is the range ; in other words, what are the variations, or alternations, to which we are subjected. They are here given :—

EXTREME Monthly Ranges of the Thermometer at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Means.
1865	21·6	18·8	19·8	19·6	14·3	17·7	13·0	14·6	15·0	20·2	22·4	21·6	18·2
1866	32·2	31·3	15·1	17·2	12·8	14·8	11·6	11·6	11·2	18·7	20·6	23·3	18·4
1867	22·9	21·1	20·1	16·8	13·4	16·9	14·0	10·2	12·6	16·1	20·5	24·2	17·4
1868	23·7	27·4	22·0	16·6	14·1	15·9	16·3	10·3	12·4	16·8	19·6	22·3	18·1
1869	20·2	24·0	17·0	14·9	13·4	16·2	14·3	12·0	12·7	14·3	23·0	19·6	16·8
1870	20·4	25·6	15·8	15·0	12·9	16·0	11·3	10·4	13·1	17·4	17·2	18·7	16·1
Means.	23·5	24·7	18·3	16·7	13·5	16·2	13·4	11·5	12·8	17·2	20·5	21·6	17·5

Fahrenheit's Scale.

98. From the line of monthly means we can read off our weather. We see that, from May to October, the range is low : there is but little radiation : it is cloudy, and moist, and oppressive ; whilst for the remaining months it is comparatively bright, and light, and cloudless : radiation is free, there are heavy dews, and a greater range.

99. In the air below the Ghauts its contained moisture is perhaps its most prominent characteristic ; and it is this condition that is first noticed by the traveller from the dry and high-lying plains of the Deccan and Central India. The extent to which it obtains is shown by the tables for the temperature of evaporation, as represented by the readings of the wet bulb thermometer. The more rapid the evaporation from the surface of the wetted muslin, the greater the difference between the instruments ; and the greater the damp, the more is it retarded, and the nearer they will be to each other ; when saturation is reached, they will both read alike, as at Jacobabad, when both stood at 110°. The following is the table :—

MEAN Readings of the Wet Bulb Thermometer at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Means.
1865 ...	69·3	68·6	71·9	78·4	79·7	79·7	78·7	77·6	76·4	76·1	71·2	69·8	74·7
1866 ...	66·5	64·8	71·4	73·6	76·6	78·6	77·2	76·8	76·2	76·3	69·9	67·7	72·9
1867 ...	67·3	65·8	71·7	75·3	78.6	79·4	77·5	77·1	76·4	76·1	69·9	69·0	73·6
1868 ...	66·4	69·4	70·2	75·4	78·4	79·2	77·2	76·5	76·4	76·7	71·3	68·6	73·8
1869 ...	68·7	68·1	71·2	76·0	77·6	78·8	78·1	77·5	76·8	75·1	70·7	71·0	74·1
1870 ...	66·2	68·3	71·7	74·9	76·6	78·2	76·8	76·0	75·9	76·0	73·2	68·5	73·5
Means... ...	67·4	67·5	71·3	75·6	77·9	78·9	77·5	76·9	76·3	76·0	71·0	69·1	73·8

Fahrenheit's Scale.

100. When the six years' monthly means of the two instruments are contrasted, it will be seen how slight is the difference between them:—

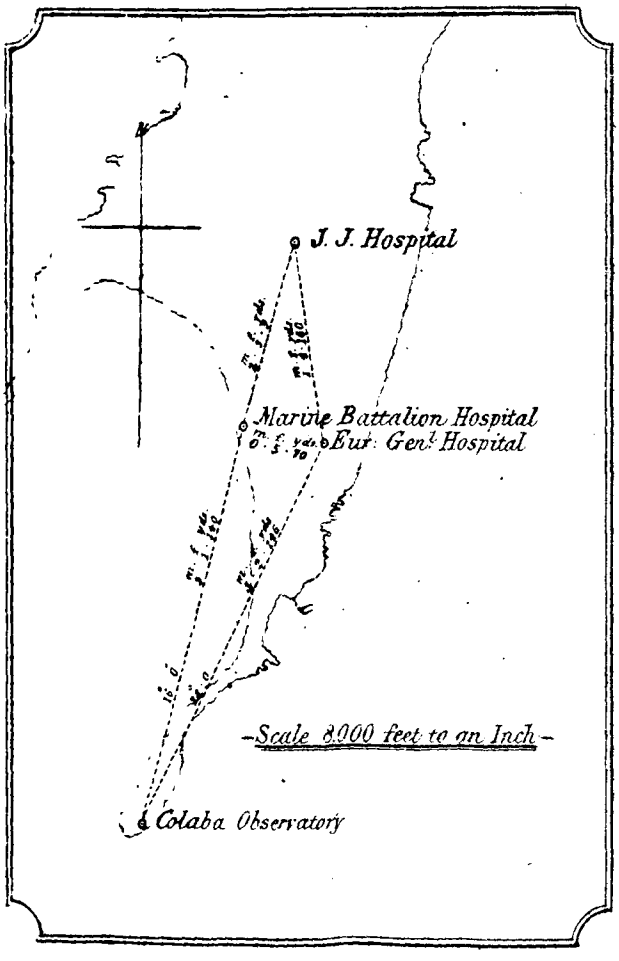
MONTHLY Means of Dry and Wet Bulb Thermometers at the Colaba Observatory.

For 1865 to 1870	January.	February.	March.	April.	May.	June.	July.	August	September.	October.	November.	December.	Means.
Dry Bul .	74·2	74·5	77·7	81·4	83·9	83·6	80·6	79·7	79·8	80·4	78·3	76·0	79·2
Wet ,,	67·4	67·5	71·3	75·6	77·9	78·9	77·5	76·9	76·3	76·0	71·0	69·1	73·8
Difference.	6·0	7·0	6·4	5·8	6·0	4·7	3·1	2·8	3·5	4·4	7·3	6·9	5·4

Fahrenheit's Scale.

101. The mean difference from June to October inclusive is only 3·7°, and in no one month is it 5°; whilst from November to May inclusive, it is not more than 6·7°. If is now easy to understand why, during the monsoon, the heat is so oppressive, and why it is so irritating to the skin. For five months there is little or no surface evaporation, and the place is one vast vapour bath; but there are the squalls and the rain, and at all other times there is the tempering influence of the sea-breeze.

102. As regards RAINFALL, there is first shown the relative positions of the several stations at which it is guaged:—



103. The Observatory register is of course the most reliable, but obviously it can only give the fall at Colaba; and Colaba is a mere strip of rock jutting out into the sea, and only a few feet above its level. The subordinate registers are not perhaps very correct, indeed the more closely they are examined the more doubtful are they; but in all of them one error is constant. They are all in excess of Colaba, and without a doubt it may be accepted that, when the rain-clouds are driven up by the S. W. monsoon, they are deflected, and break more frequently over against the higher points of Malabar Hill and Chinchpoogly. It is certain that the fall increases in a line from south to north, but the extent of increase is not so clear. For 1872 the returns were as follows :—

RAINFALL at the undermentioned Stations in Bombay during 1872 *expressed in inches and cents.*

	Stations.	May.	June.	July.	August.	September.	October.	Total Fall.
1	Colaba Observatory ...	0·06	24·43	24·04	9·62	17·26	1·07	76·48
2	Marine Battalion Hospital ...	...	28·25	26·30	9·94	17·35	...	81·84
3	European General Hospital ...	...	26·10	23·87	9·63	18·20	0·16	77·96
4	Jamsetjee Jejeebhoy Hospital ...	...	34·33	27·88	9·58	17·72	..	89·51
	Monthly Means ...	...	28·27	25·52	9·69	17·64	...	81·44 Mean.

104. Now, this table proves rather too much, as may be seen by testing its differences of fall by the distances between the stations, thus—

					m.	f.	yds.		In. Cents.	
Between	1	and	2	distance	3	1	140	difference	+ 4·36	at 2
,,	1	,,	3	,,	3	2	145	,,	+ 1·48	,, 3
,,	2	,,	3	,,	0	5	70	,,	+ 3·88	,, 2
,,	1	,,	4	,,	5	4	149	,,	+ 13·03	,, 4
,,	2	,,	4	,,	2	3	9	,,	+ 7·67	,, 4
,,	3	,,	4	,,	1	4	160	,,	+ 11·55	,, 4

105. As the physical conditions are pretty much the same for all the stations, it is extremely improbable that at two points, almost equidistant from the Observatory, the fall should differ so much within so short a radius; and it is almost impossible that, on the east and west sides of a field not 3½ miles distant, itself not 6 furlongs in breadth, there can be a difference of nearly 4 inches. Doubtful, too, is the excess of 13 inches at the J. J. Hospital, 5½ miles distant; and still more doubtful the difference of 11½ inches between two points only a mile and a half apart.

106. The subjoined is the return for the Colaba Observatory, and it shows that the mean rainfall for six years was 73·09, and that most of it falls in July.

RAINFALL at the Colaba Observatory in inches and cents.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1865 ...	0·38	0	0	0	0	10·61	18·28	36·42	4·86	6·16	1·14	0	77·85
1866 ...	0	0·11	0	0	0	13·47	40·34	20·34	3·44	0·74	0	0	78·44
1867 ...	0	0	0	0	0	8·70	29·39	12·21	6·80	5·07	0·13	0	62·30
1868 ...	0	0	0·01	0	0	13·52	20·43	20·29	7·71	0·14	0·02	0	62·12
1869 ...	0	0	0	0	0·03	26·22	23·89	15·24	22·56	3·55	0·05	0·12	91·66
1870 ...	0	0	0·03	0·02	0	21·73	26·43	6·27	7·08	4·65	0	0	66·21
Means ...	0·06	0·02	...	...	...	15·71	26·46	18·46	8·74	3·38	0·22	0·02	73·09

The days upon which there was rain are also shown, and it will be seen that, although the greatest amount falls in July, there are more rainy days in August.

DAYS upon which Rain fell at the Colaba Observatory.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1865 ...	2	0	0	0	0	20	21	31	19	10	1	0	104
1866 ...	0	1	0	0	0	18	30	27	16	6	0	0	98
1867 ...	0	0	0	0	0	20	28	29	21	9	3	0	110
1868 ...	0	0	1	0	0	29	28	26	21	1	1	0	107
1869 ...	0	0	0	0	1	17	22	25	29	6	1	2	103
1870 ...	0	0	1	1	0	24	29	29	17	8	0	0	109
Means ...	0·3	0·2	0·3	0·2	0·2	21·3	26·3	27·8	20·5	6·6	1·0	0·3	105

107. The subjoined is the Byculla register of the monsoon rainfall for 42 years, and it ranges from a maximum of 118·88 in 1849, to a minimum of 35·10 in 1855. For seven years it was under 60 inches, for 7 years it was under 70, for 15 years it was between 70 and 80, for 7 years between 80 and 90, for 2 years between 90 and 100, and for 4 years it was more than 100. The mean for the whole period is 74·95 and, adopting this, it exceeds the Colaba mean of 5 years by 1·86. This probably is the correct difference in favor of the more northern of two points 5½ miles apart.

MONSOON RAINFALL at BOMBAY *for Forty-two Years, from* 1832 *to* 1873.

Years.	May.	June.	July.	August.	September.	October.	Total.
1832 ...	...	13·63	48·05	4·65	7·11	0·65	74·09
1833 ...	...	12·50	21·80	13·35	23·54	0·20	71·39
1834 ...	...	14·16	21·83	18·05	12·55	3·88	70·47
1835 ...	...	9·99	4·27	35·76	12·17	0·42	62·61
1836 ...	...	21·36	24·53	37·41	4·69	...	87·99
1837 ...	...	12·61	24·39	22·43	5·15	...	64·58
1838 ...	...	29·70	8·70	7·34	5·04	...	50·78
1839 ...	...	18·28	32·19	18·45	4·70	...	73·62
1840 ...	...	25·04	24·24	4·20	7·55	2·12	63·15
1841 ...	...	25·27	21·21	20·35	1·27	3·21	71·19
1842 ...	...	16·84	26·45	37·10	10·41	4·36	95·16
1843 ...	...	9·33	22·49	18·20	9·00	0·25	59·27
1844 ...	...	14·17	35·52	6·55	9·16	...	65·40
1845 ...	...	19·70	20·44	6·56	8·03	...	54·73
1846 ...	...	31·71	40·55	5·60	8·45	1·16	87·48
1847 ...	...	35·47	16·80	8·92	5·80	0·32	67·31
1848 ...	...	42·37	13·83	7·87	4·01	5·34	73·42
1849 ...	...	22·82	51·68	13·66	29·65	1·07	118·88
1850 ...	...	17·69	19·13	6·39	4·56	3·38	51·15
1851 ...	...	30·73	46·97	23·83	4·61	...	106·14
1852 ...	...	24·75	24·84	10·54	15·21	0·12	75·46
1853 ...	...	38·39	14·32	8·57	8·37	...	69·65
1854 ...	...	19·28	35·95	3·90	13·61	1·75	74·49
1855 ...	...	13·18	11·80	3·15	6·91	0·06	35·10
1856 ...	0·66	25·46	26·94	9·17	8·85	...	71·08
1857 ...	1·81	16·81	22·11	20·20	18·30	...	79·23
1858 ...	1·95	15·28	22·64	9·50	12·53	...	61·90
1859 ...	...	28·99	30·87	15·71	6·27	...	81·84
1860 ...	0·06	31·62	26·07	9·13	7·77	...	74·65
1861 ...	0·17	27·74	38·69	36·35	3·13	...	106·08
1862 ...	...	22·43	15·92	13·65	24·56	...	76·56
1863 ...	0·12	31·44	26·89	13·35	8·53	...	80·33

Years.	May.	June.	July.	August.	September.	October.	Total.
1864 ...	...	25·65	13·72	11·42	5·21	...	56·00
1865 ...	...	14·13	16·47	39·11	3·75	...	73·46
1866 ...	...	17·56	47·07	23·87	3·89	...	92·39
1867 ...	...	11·04	35·89	15·13	8·09	3·42	73·57
1868 ...	...	21·18	26·65	23·95	6·45	0·20	78·43
1869 ...	0·04	29·56	28·93	28·67	24·97	3·22	115·39
1870 ...	0·22	24·25	29·14	11·07	11·12	5·26	80·06
1871 ...	...	13·96	16·41	8·96	7·87	...	47·20
1872 ...	...	31·70	28·89	10·62	16·40	...	87·61
1873 ...	1·15	17·40	21·29	35·77	11·81	...	87·42
Means ...	0·15	22·03	25·87	16·15	9·79	0·96	74·95

Measured at Byculla, and expressed in inches and cents.

108. Tabulating the fall by ascending numbers, and dividing the whole time into equal periods of 7 years each, it will be seen that it is too irregular to be reduced to recurring cycles.

MONSOON RAINFALL at BYCULLA *expressed in inches and cents, and shown for 6 equal periods of 7 years each, from 1832 to 1873 inclusive.*

1st Period.	2nd Period.	3rd Period.	4th Period.	5th Period.	6th Period.
35·10 in 1855	61·90 in 1858	70·47 in 1834	73·62 in 1839	79·23 in 1857	87·99 in 1836
47·20 „ 1871	62·61 „ 1835	71·08 „ 1856	74·09 „ 1832	80·33 „ 1863	92·39 „ 1866
50·78 „ 1838	63·15 „ 1840	71·39 „ 1833	74·49 „ 1854	81·06 „ 1870	95·16 „ 1842
51·15 „ 1850	64·58 „ 1837	71·49 „ 1841	74·65 „ 1860	81·84 „ 1859	106·08 „ 1861
54·73 „ 1845	65·40 „ 1844	73·42 „ 1848	75·46 „ 1852	87·42 „ 1873	106·14 „ 1851
56·00 „ 1864	67·31 „ 1847	73·46 „ 1865	76·56 „ 1862	87·48 „ 1846	115·39 „ 1869
59·27 „ 1843	69·65 „ 1853	73·57 „ 1867	78·43 „ 1868	87·61 „ 1872	118·88 „ 1849

MEAN values of different METEOROLOGICAL ELEMENTS, *as noticed at the Colaba Observatory from 1865 to 1870 inclusive.*

Years.	Standard Barometer corrected to 32° Fahr.	Temperature by Fahrenheit's scale. Of Air.	Of Evaporation.	Of Dew point.	Maximum.	Minimum.	Range.	Pressure of Vapour.	Relative Humidity.	Velocity of Wind in Miles per Hour.	Extent of Cloudy Sky.	Rainfall in inches and cents. Annual mean.	Maximum in month.	No. of rainy days.
1865	29·811	80·3	78·0	72·0	96·0	66·1	* 29·9	0·789	0·760		4·5	77·85	36·42 ‡	104
1866	29·822	78·3	73·0	70·5	91·8	56·6	35·2	0·762	0·780		3·1	78·44	40·34 †	98
1867	29·824	78·7	73·7	71·5	92·6	61·8	30·8	0·784	0·791		3·7	62·30	29·39 †	110
1868	29·836	79·1	73·8	71·5	92·5	62·2	30·3	0·785	0·785	12·5	3·4	62·12	20·43 †	107
1869	29·814	79·6	74·1	71·7	92·4	63·3	29·1	0·787	0·769	12·4	3·7	91·66	26·22 §	103
1870	29·797	79·0	73·5	71·1	92·7	62·9	29·8	0·772	0·776	11·8	4·0	66·21	26·43 †	109
Means	29·817	79·2	74·4	71·4	93·0	62·1	30·8	0·780	0·777	12·2	3·7	73·09	29·87	105

* The Anemograph was put up in 1867.
† July
‡ August
§ June

The WIND is registered perpetually at the Colaba Observatory—both its force and direction—by one of Dr. Robinson's anemographs, which was put up in 1867. The observations for one complete year—from June 1867 to May 1868—have been compiled by Mr. Chambers, and analyzed exhaustively, and the results are given in his Report, also in the *Bombay Builder* for June and August 1869. These results show, for stated periods, the lines of direction and forces of the prevalent winds, which Mr. Chambers calls "*normal winds.*" Winds on either side of these lines, or in excess or defect of the forces, are termed

"*abnormal*;" and it is said that, if the deflections be taken for given times, they just balance each other: "the additional winds from the right will neutralize those from the left." The normal winds are ascribed to "causes ordinarily effective," and the abnormal to "variations in the effectiveness, or power of those causes, or to extraordinary causes." It is also shown, that land and sea-breezes obtain as well during the monsoon as in the dry months; and the following explanation is given of these phenomena:—"As the sun rises in the heavens, the soil in the interior of India becomes heated by solar radiation, and in its turn heats the air above it, which in consequence expands and overflows at the upper limiting surface of the atmosphere. A quantity of air being thus removed, the barometric pressure near the heated soil is diminished, and air flows in from the cooler regions to seaward to equalise the pressure. The flow continues above and below, till the soil has attained nearly its mean temperature, or the temperature of the sea, which varies comparatively little in the course of the day. During the interval, the temperature of the soil and the velocity with which the air flows, both pass through their maxima, and that nearly simultaneously. At this period the lower flow of air is at Bombay, a west wind commencing about 11 A.M. or noon, with a maximum velocity at 3 or 4 P.M., and ceasing about 10 P.M. From this time the air begins to flow seaward, reaching its maximum velocity about 8 A.M., and ceasing about 11 A.M. or noon. * * * * In the same manner that the soil absorbed more of the sun's rays than the sea, and thus became heated, so it radiates more heat into space and, after both have acquired the same temperature, it cools the more rapidly; the air above it then becomes cooled and condensed, and fresh air flows in, to maintain the level as it were, at the upper surface of the atmosphere. In consequence the barometric pressure increases, and the air begins to push itself out to seaward, where the same cause has been operating, but less effectually, to raise the barometer. The soil inland becoming by its superior radiation much cooler than the sea, the land breezes will continue to flow until the sun has again risen and radiated sufficient heat upon the soil, to restore the equilibrium of temperature between it and the sea, after which the same cycle of changes will again be gone through day by day." It is inferred that in November the land and sea breezes are felt for a distance of not more than 68 miles from the coast. In February, March, and April not more than 62 miles, and in December and January not more than 58 miles.

Mr. Chambers also points out how important an element is velocity, "because to the meteorologist the chief significance of wind lies in the interchange of meteorological conditions that result from the transfer of bodies of air from districts in certain conditions to other districts where the conditions are different, and the quantity or extent of motion of the air bodily is the proper measure of this transfer. The same bodily motion of the atmosphere, carrying as part of it the vitiated air of populous towns and districts, and supplying its place by fresh air, pure or impure, according to the influences to which it has been subjected in its previous course, is also the relation in which the wind affects ventilation."

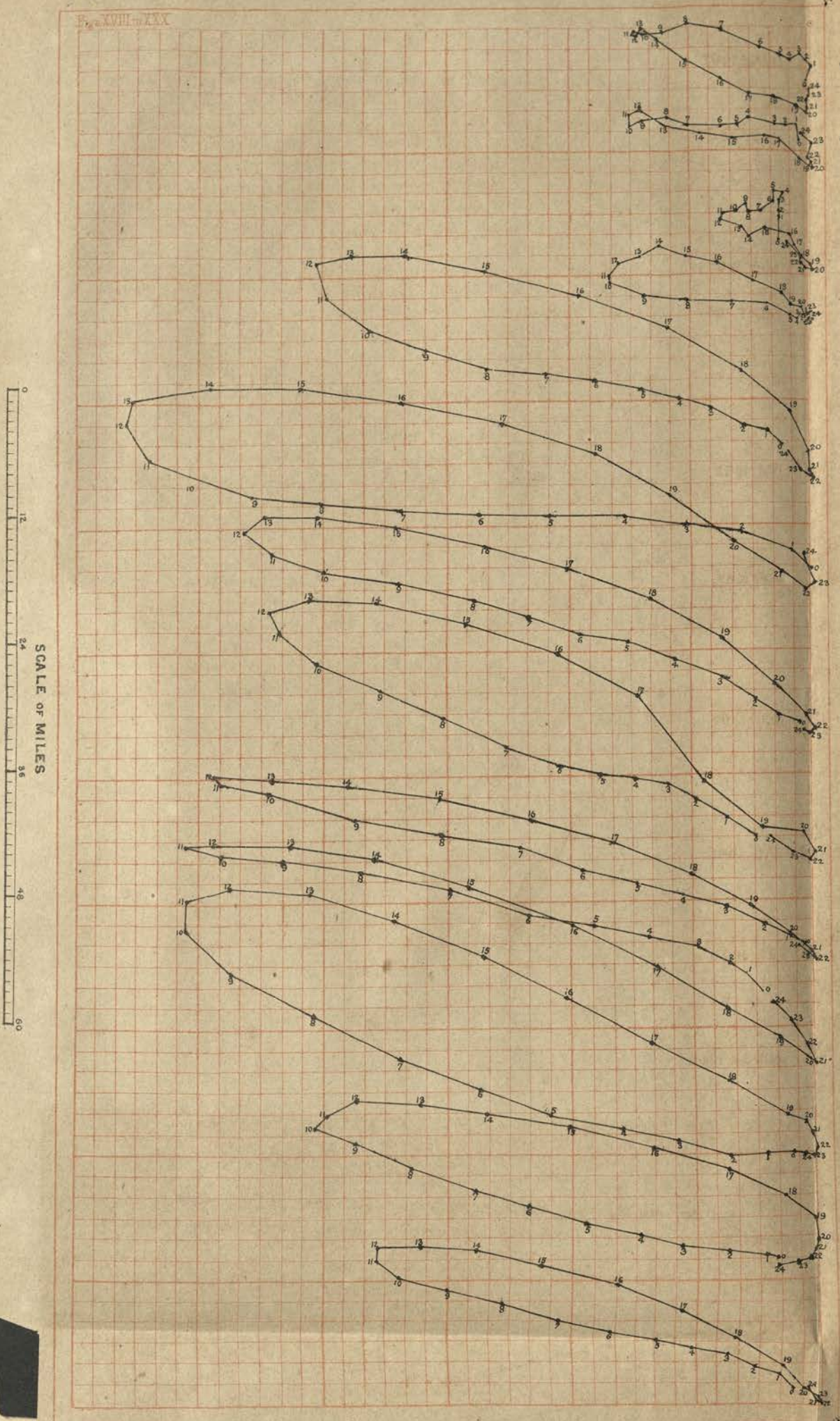
The mean velocity is given in the following table; it is about 12·2 miles per hour:

TABLE showing the Mean Velocity of the WIND *in Miles per Hour.*

Years.	Mean Velocity for June to August.	Mean Velocity for September to May.	Greatest Monthly Mean.	Least Monthly Mean.	Mean for year.
1868	15·9	10·4	19·9 for June	8·4 for October	12·5
1869	17·3	10·7	20·7 „ July	9·2 „ January	11·5
1870	17·2	10·0	19·5 „ July	8·7 „ November	11·8
Means.	17·8	10·3	20·0	8·7	12·2

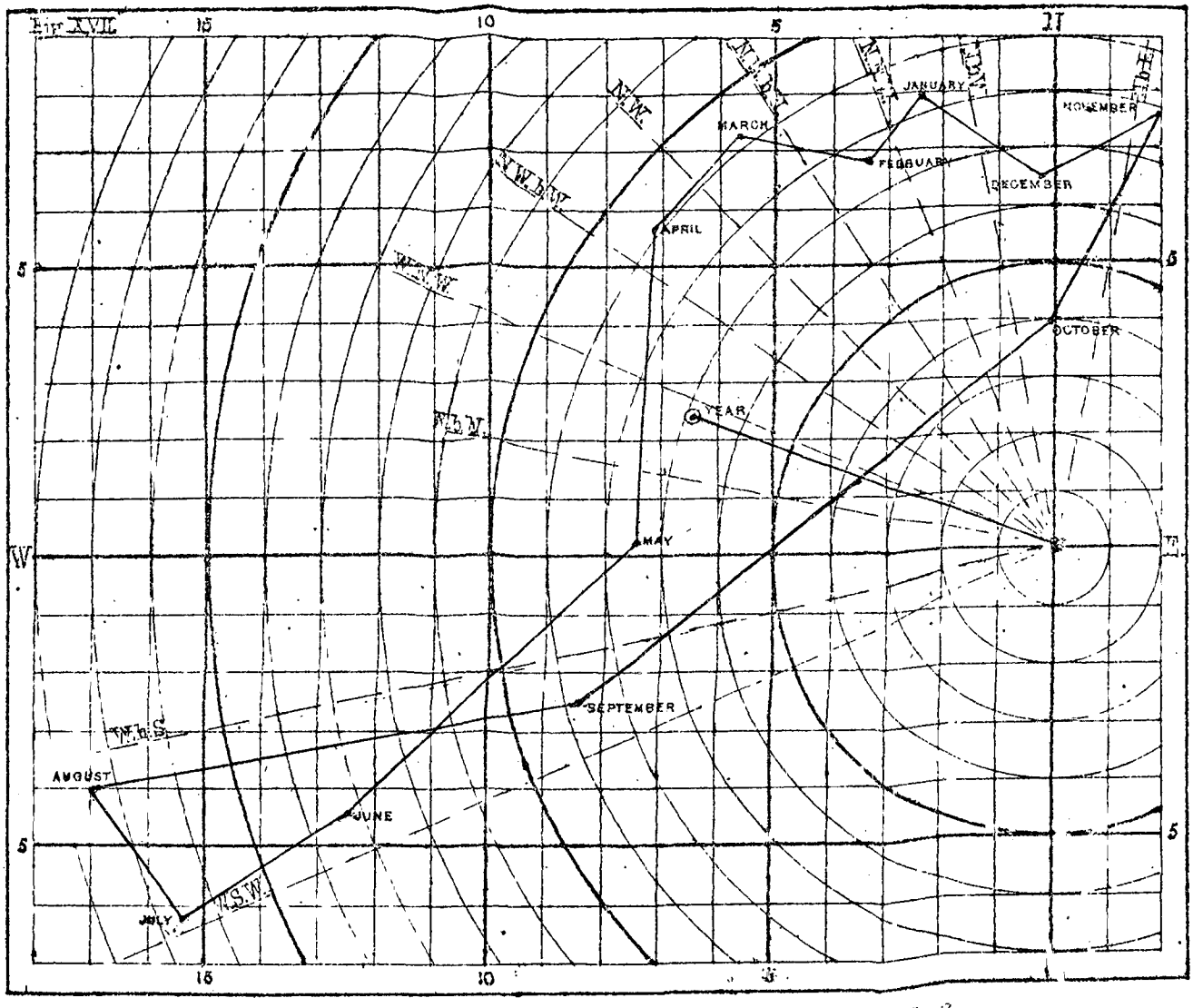
Curves showing the relative positions at different hours of the day of the same body of air moving under the influence solely of the diurnal variation of the normal Wind at Bombay, in each month and for the whole year.

Pl. XVIII to XXX



The directions are reckoned – North, upward; South, downward; East, to the right; and West to the left.
The figures placed along the course of the curves indicates the hours of the Bombay Civil Day.

Curve showing the normal Direction and Velocity (in miles per hour) of the Wind at Bombay in each of the months from 1867 to May 1868 and in the whole year.



The numbers on the margin of the curve-form represent miles per hour of velocity.

The stronger winds are those from June to September, when the direction is W.S.W. From November to May there is a general sweep round from N.N.E. through N. to W. In October the transition from the monsoon character to that of November has only been partially accomplished. All the changes are delineated by a series of diagrams, of which two are here reproduced.

The following table shows the relative frequency of the same wind from each of the sixteen principal points of the compass. The line of sums gives the total number of observations, and each observation represents one single time when the wind blew from the quarter indicated. The line of means gives the mean for each year from each point. The means for each quadrant are—

Between N. and E. 1427·2

„ E. „ S. 487·2

„ S. „ W. 1488·2

„ W. „ N. 2807·5

TABLE showing the relative frequency of the same WIND *from each of the* 16 *principal directions, as noted by the Anemograph at the Colaba Observatory.*

Years.	N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.
1868	721	295	580	298	224	216	103	113	114	172	347	1,285	1,055	937	1,273	882
1869	648	422	542	299	203	231	167	133	146	236	473	1,222	1,005	930	1,071	853
1870	638	369	534	363	201	189	98	71	120	124	282	1,432	950	1,054	1,301	919
Sums	2,007	1,086	1,656	960	628	636	368	317	380	532	1,102	3,939	3,010	2,921	3,645	2,654
Means	669	362	552	320	209·3	212	122·7	105·7	126·6	177·3	367·3	1,313	1,003·3	973·7	1,215	884·7

The Anemograph was put up in 1867.

109. For the DECCAN there are no meteorological observations like those for Bombay, and there are minor differences of climate at different places; but, speaking generally, the chief characteristic is its extreme dryness. The rainfall is moderate on the plains, and exceptionally heavy at points within the Ghaut area. From November to the end of March the winds are easterly, are very dry and, to many, very disagreeable. The following are the values for Poona:—

TABLE showing Mean TEMPERATURES, *as noted during two years at the Poona Observatory.*

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean.
70·3	75·1	79·0	85·4	85·1	79·5	76·1	74·7	75·5	75·7	72·5	69·6	76·5

Fahrenheit's Scale.

TABLE showing Mean Monthly RAINFALL, *as registered at the Civil Hospital, Poona, from* 1845 *to* 1862, *inclusive.*

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean.
0·02	...	0·11	0·44	1·05	3·96	6·85	3·51	3·91	3·75	0·90	0·02	24·52

TABLE showing the average number of Days during which the WIND *blew from each of the sixteen principal points of the Compass, as noted at the Poona Observatory during two years.*

N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W
25	8	10	21	31	13	10·5	8·5	8	3·5	30·5	44	63·5	35	34·5	19
		64			63				86				152		
			127							238					

110. These values are here given, not because the Poona observations are better than those made elsewhere, but because the place itself is tolerably well known. Strictly speaking, the climate of the Deccan should be considered separately for each one of its three physical divisions :—

1. The Ghauts.
2. The uplands at their base.
3. The outlying plain.

111. The first of these divisions is well represented by Mahableshwar, and for this place there are by far the best observations yet recorded within the Presidency, always excepting those of Colaba. They extend over 15 years, and were compiled by Dr. Murray, himself the chief contributor. Being so complete, they are given *in extenso*; but as the table is somewhat lengthy, its principal values are also here recast for easy reference :—

TABLE showing Mean Values of different Meteorological Elements for MAHABLESHWAR, *recast from Dr. Murray's Table of Observations from* 1829 *to* 1843, *inclusive.*

Height above sea level about 4,500 ft. Height above plain about 2,800 ft. Mahableshwar from 1829 to 1843, inclusive. Months.	Atmospheric Pressure. Mean Daily Reading of the Mercurial Barometer.	Temperature, by Fahrenheit's scale. Of the Air.	Of Evaporation.	Approximate Dew point by Glaisher's factors.	Maximum.	Minimum.	Range.	Rainfall in Inches and Cents. Total.	No. of Rainy Days.	Wind. Direction.	Force.	
January	25·737	64·0	54·2	46·0	70·6	57·4	13·2	0·05	½	Easterly.	Moderate.	Clear.
February	25·705	66·3	53·3	42·8	73·3	59·4	13·9	0·25	½	E. N.E. N.N.W.	"	Do.
March.....	25·688	71·5	55·8	44·0	78·6	64·5	14·1	0·15	1	N. E.N. N.W.	"	Do.
April	25·667	74·5	59·1	44·5	81·5	67·6	13·9	1·31	4	"	"	Do. with occasional clouds.
May	25·643	72·4	62·9	55·7	78·0	66·0	12·9	3·31	6	"	"	Do. with clouds and frequent fogs, latter half.
June	25·664	66·3	63·7	61·5	69·3	63·4	5·9	46·53	24	W.S.W.	"	Foggy.
July	25·600	63·2	61·4	59·9	64·7	61·8	2·9	92·10	30	"	High.	Continued dense fogs.
August	25·647	63·2	61·5	60·0	64·5	61·9	2·6	72·33	30	"	"	Do. do.
September....	25·524	63·9	61·2	59·0	65·9	62·0	3·9	31·32	24	"	Moderate.	Frequent light fogs.
October.....	25·810	66·6	60·2	55·0	71·5	61·7	9·8	4·58	8	Variable.	Light.	First half cloudy with drifting fogs, last half clear.
November....	25·733	64·4	56.7	50·3	70·2	58·7	11·5	2·07	3	Easterly.	High.	Clear.
December	25·739	63·2	55.4	48·8	69·2	57·2	2·0	0·05	¼	"	"	Do.
								Sum	Sum			
	25·684	66·6	58·8	52·5	71·5	61·8	9·7	254·05	131½			

The same shown by Dr. Murray's Seasons.

Seasons.								Sum.	Sum.			
Cold from October 1st to February 28th	25·757	64·9	55·96	53·6	70·96	58·88	12·08	7·00	12½	....	....	
Hot from March 1st to May 31st.	25·686	72·7	59 17	48·1	79·66	66·03	13·63	4·77	11	....	....	
Rainy from June 1st to September 30th	25·609	64·1	61·90	60·1	69·10	61·52	4·58	242·28	108	....	....	
Means..	25·081	67·2	58·98	52·3	72 24	62·14	10·10	254·05	131½			

112. The mean daily maximum of the barometer is 25·730, and the minimum is 25·639, giving a daily mean of 25·684 and a range of 0·114. The lowest readings are, of course, those during the rains. A striking feature in the table is the equable distribution of temperature, whether it be taken by the day, or the month, or the seasons, or the year, or the whole period of fifteen years. For the whole period the mean is 66·6; and, if this be taken as a fixed point, the sums of the differences above and below it just balance each other: they are 18·4 and 18·3 respectively. The mean of all the Octobers is that of the whole period. For March, April, and May it is *plus* 6·1, and for all the other months it is *minus* 2·2. Between the hot and cold season the difference is 7·8, between the hottest month (April) and the general mean it is 7·9, and between the hottest and coldest months it is 11·3. The mean difference between each successive month throughout the year is 2·4, and except for March and June this mean never differs more than 3° from the general mean. In the cold season the mean temperature is 1·7 below that of the year, and the range is 0·90 above the annual range. In the hot season the mean is 6·1 above the general mean, and the range is 3·45 above the annual range. During the rains the mean is 2·1 below the mean temperature of the year, and the range is 3·56 below the annual range. These results are better seen if tabulated, thus. The details for rainfall are added :—

SUMMARY of Chief Meteorological Elements for MAHABLESHWAR, *from* 1829 *to* 1843, *inclusive.*

Mean annual reading of Mercurial Barometer for 15 years.	25·684
„ daily range „	0·114
„ Temperature of air, Fahrenheit „	66·6
„ „ „ Evaporation „	58·8
„ Approximate Dew Point by Glaisher's factors	51·9
„ Temperature of Cold season „	64·9
„ „ „ Hot „ „	72·7
„ „ „ Rainy „ „	64·1
„ „ Maximum—in April „	71·5
„ „ Minimum—in July, August, Dec. „	61·8
„ daily range „	9·7
„ difference between mean temperature of successive months.	2·4
„ „ „ „ „ each year and mean temperature of 15 years...	3·0
Difference between means of Hot and Cold seasons	7·8
„ „ „ Hot „ Rainy „	8·6
„ „ „ Cold „ Rainy „	0·8
„ „ hottest and coldest months.	11·3
„ „ hottest month, and general mean of 15 years	7·9
„ „ mean of hot season „ „ „ „	6·1
„ „ „ cold „ „ „ „ „	1·7
„ „ „ rainy „ „ „ „ „	2·5
Mean annual rainfall of 15 years.	254·05
„ fall by day	131·04
„ „ night	127·51
„ No. of rainy days	131·
Extreme day fall	13·06
„ monthly „	134·42
„ annual „	305·27

113. A special interest attaches to the rainfall, both on account of its quantity, and what may be termed the irregularity of its general distribution. At one time the surcharged clouds break to deluge the Konkan, at another time they are carried to the higher level of the Ghauts, and are there discharged. The local fluctuations within small areas are easily explained, but the general question is a more difficult one, and it yet awaits solution. Dr. Murray has pointed out that, during twenty consecutive years, the year of heaviest fall on the coast (1831) was, with one exception (1838), the scantiest on the Ghauts; whilst the

heaviest Ghaut monsoon (1842) was also the heaviest in Bombay. He cites the following:—

In three years (1841, 1842, 1846) the fall was above the average at both places.

In four years (1835, 1838, 1339, 1847) it was below the average at both places.

In six years (1830, 1831, 1832, 1833, 1836, 1848) it was in excess at Bombay, and below the average on the Ghauts.

In seven years (1829, 1834, 1837, 1840, 1843, 1844, 1845) it was below the average at Bombay, and in excess at Mahableshwar.

The above results are here tabulated:—

COMPARATIVE Fall of Rain at BOMBAY *and* MALCOLM PITH, *from* 1829 *to* 1848, *inclusive.*

	Years.																			
	1829.	1830.	1831.	1832.	1833.	1834.	1835.	1836.	1837.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	Average Yearly fall.
Bombay.	65·65	71·86	101·88	74·09	71·39	70·47	62·61	87·99	64·58	50·78	62·62	63·15	71·49	97·16	59·27	65·40	54·73	87·48	67·31	78·37	71·5 In.
Malcolm Pk.	257·06	232·93	185·32	226·87	203·74	297·41	226·71	243·56	267·76	180·17	233·23	284·43	281·04	304·90	285·67	262·32	249·93	288·34	218·83	245·01	248·75 In.

114. Taking Mahableshwar as a centre, and running out lines east, and west, the differences of rainfall are very strikingly illustrated. At Khandala, also on the western edge of the Ghauts, but 2,627 feet lower, the fall is less by 113 inches; at Dapuli in the Konkan, 900 feet, it is less by 119 inches; at Ratnagiri on the coast, but 150 feet above the sea, it is less by 140 inches; at Tanna almost on the coast, and at sea level, it is less by 156 inches, and at Bombay it is less by 179 inches. On the eastern line these differences are more abrupt. Starting from the centre with 254 inches we find, that at Sindola, 1 mile east of the Sanitarium, 100 feet higher, but screened by Mount Charlotte, higher yet by 100 feet, the fall is less by 74 inches; at Panchgunny, 10 miles farther, it is less by 204 inches; at Wye, 4 miles farther, it is less by 229 inches; and at Phultun, some 25 miles farther, it is less by 235 inches. In tabulating these differences, the upper line of numbers represents the fall at the place indicated, and the lower line shows the difference between that fall and the fall at Mahableshwar:—

WEST.				GHAUTS.		EAST.			
Bombay Sea Level.	Tanna Sea Level.	Ratnagiri 150 feet.	Dapuli 900 feet.	Khandala 1,837 feet.	MAHABLESHWAR 4,500 feet.	Sindola 4,600 feet.	Panchgunny 4,000 feet.	Wye 2,300 feet.	Phultun 2,300 feet.
					inches.				
75	98	114	135	141	254	180	50	25	19
179	156	140	119	113	0	74	204	229	235

115. Leaving now the Ghauts for the uplands at their base, Satara and Belgaum are good representative stations, the line connecting them being one of 142 miles. Ahmadnagar, too, and Sholapur are inland points 136 miles apart, and distant from the sea about 110 and 180 miles, whilst their connecting lines with the upland points are respectively 119 and 169 miles. The great quadrilateral here embraced has an area of some 16,000 square miles, about one-third that of England and Wales. Between Satara and Belgaum there is no great difference as regards altitude, or position, or proximity to the sea. In a general way there

is much the same temperature, the same humidity, the same computed dew point, the same maximum and minimum, and the same range; the winds, too, are from the same quarters; but at Belgaum the rainfall is a little heavier. The subjoined table of meteorological values for Satara, is from one by Dr. Murray:—

MEAN Values of different Meteorological Elements for SATARA, *from Observations by Dr. Murray, from* 1844 *to* 1847, *inclusive.*

Months.	Temperature—Fahrenheit.						Rainfall.		Winds.	
	Of the Air.	Of Evaporation.	Dew Point.	Maximum.	Minimum.	Range.	Total.	No. of Rainy Days.	Direction.	Force.
January	73·4	64·9	59·3	82·1	64·7	17·4	0·02	1 in 2 years.	E.S.W.	Moderate.
February	73·2	63·9	57·1	82·3	64·1	18·2	0·08	3 in 4 years.	E.W.	Fresh.
March	81·5	71·3	64·4	91·8	71·3	20·5	0·04	3 in 4 years.	E.S.W.	Moderate.
April	85·1	74·6	67·9	95·5	74·8	20·7	2·97	2	E.S.W.W.	„
May.....	85·5	77·3	71·9	95·0	76·0	19·0	1·26	4	„	„
June	75·9	71·4	68·2	79·7	72·1	7·6	7·53	20	Variable.	„
July.....	73·6	70·1	67·5	75·9	71·3	4·6	10·44	24	W.S.W.	Fresh.
August	72·7	69·0	66·2	74·3	71·1	3·2	3·28	24	W.	„
September	73·8	69·6	66·5	77·7	69·9	7·8	4·54	12	„	Light.
October	76·6	70·5	66·2	82·8	70·4	12·4	5·67	6	Variable.	„
November	70·9	63·3	57·5	77·9	63·9	14·0	2·74	2	E.	Moderate.
December	71·2	63·1	56·9	79·6	62·9	16·7	0·66	1	E.S.	„
Means.....	76·0	69·0	64·0	82·8	69·3	13·5	39·23	97		

The same shown by Seasons.

Cold Season ...	72·2	63·8	57·7	80·5	63·9	16·6	3·50	4
Hot „ ...	84·0	74·4	68·1	94·1	74·0	20·1	4·27	7
Rainy „ ...	74·5	70·1	66·9	78·1	70·9	7·2	31·46	86
Means.....	76·9	69·4	64·2	84·2	69·5	14·7	39·23	97

The mean atmospheric pressure is 27·907.

116. *The Hot Weather* at Satara sets in about the middle of March, but in this season even the nights are pleasantly cool. Up to 7 A.M. there is a light easterly wind, and it is not until this has died out that it is oppressive. About noon the sea-breeze sets in somewhat suddenly, and continues, *as the hot wind,* until 8 or 9 P.M., or later. In April and May it lasts all through the night, but shifts towards morning; and in May it is so tempered by the mists which are now gathering on the Ghauts, that it is a fairly cool wind after 5 or 6 P.M. *The rainy season* begins about the middle of June, and when the first burst is over the fall is in frequent showers, which take off towards the end of August, when the wind draws to the north of east. During this time the weather is comparatively cool, very equable, and very agreeable; but in October it is close, sultry, and oppressive, and later on there are heavy dews. *The cold season* is in by the end of November; and it is pleasant enough, but dry, and the easterly winds are often felt to

disagreeable. By the end of January they begin to draw round to the west. In the rains the easterly winds of the forenoon shift over to the west through south; in the hot season through north. The westerly wind also follows this order in traversing to east. The mean atmospheric pressure is 27·907.

117. Now, these remarks upon the climate of Satara will apply, with modifications, to the whole of the Deccan. In one place there will be more rain, in another the range is less, or the cold greater, or the heat more intense. There are wind fluctuations of different elements; but the general characters are everywhere the same, as may be seen from the following tables:—

MEAN Values of different Meteorological Elements for BELGAUM, *from Observations by Dr. Waller, from* 1854 *to* 1856, *inclusive.*

Months.	Temperature—Fahrenheit.						Rainfall.		Wind.	
	Of the Air.	Of Evaporation.	Dew Point.	Maximum.	Minimum.	Range.	Total.	No. of Rainy Days.	Direction.	Force.
January ...	73·25	63·50	56·3	77·75	65·50	12·25	...	Not given.	N.E.	Not given.
February ...	75·57	63·72	55·3	79·75	68·50	11·25	...		N.E.—S.W.	
March ...	81·32	68·15	59·2	84·57	75·70	8·87	0·29		S.W.N.E.S.E.	
April ...	82·86	67·86	57·8	88·32	71·95	16·37	2·06		N.W.S.W.N.E.	
May ...	84·06	72·15	64·2	89·57	78·17	11·40	2·90		W.S.W.	
June ...	76·23	71·87	68·7	87·10	71·20	15·90	5·86		S.W.	
July ...	72·68	69·66	67·4	76·95	69·70	7·25	12·84		S.W.	
August ...	72·79	69·53	60·1	77·42	71·20	6·22	4·94		S.W.W.	
September ...	72·83	69·02	66·2	76·42	69·70	6·72	4·95		S.W.	
October ...	74·13	69·45	66·0	77·68	69·45	8·23	7·45		S.W.—N.E.	
November ...	73·40	64·89	58·5	77·17	70·95	6·22	0·05		N.E.	
December ...	72·29	64·03	57·8	75·18	67·97	7·21	0·16		N.E.E.	
Means ...	75·90	67·82	62·0	80·86	70·71	10·15	41·50			

The same shown by Seasons.

Cold Season ...	73·63	65·03	57·0	77·46	68·23	9·23	0·21
Hot do. ...	82·75	69·39	60·4	87·48	75·27	12·21	5·25
Rainy do. ...	73·73	70·22	65·7	79·11	70·25	8·86	36·04
Means ...	76·70	68·21	61·0	81·35	71·25	10·10	41·50

The mean atmospheric pressure is 27·465.

MEAN Values of different Meteorological Elements for AHMADNAGAR, *from Observations by Dr. Barra in* 1835-36.

Months.	Temperature—Fahrenheit.				Rainfall.		Winds.	
	Of Air.	Maximum.	Minimum.	Range.	Total.	No. of Rainy Days.	Morning.	Evening.
January	68·0	80	54	26	...	...	N.E. N.W.	S.W. N.E.
February	71·3	84	55	29	...	...	N.E. by N.	N.E.
March	81·6	90	70	20	...	...	N.E.	N.E.
April	79·3	96	71	25	0·42	5	N.E. by N.	N.E.
May	86·3	100	71	29	0·01	1	N.E. W.N.	N.E.
June	79·6	92	74	18	2·68	13	S.E.	S.E. by S.S.W,
July	76·6	89	71	18	0·10	4	S. and W.	S. and W.
August	75·3	90	67	23	6·10	15	S.W.	S.W.
September ...	75·3	87	67	20	7·61	14	S.W.	S.W.
October	76·3	90	61	29	3·29	7	N.E. N.N.W.	E. of N.
November ...	71·6	84	58	26	2·35	2	N.E. N.N.E.	S.E.
December ...	69·3	82	47	35	...	...	S.E. E. N.E.	and S. W. Occasionally.
Means... ...	75·98	88·7	63·8	24·9	22·56	61		

The same shown by Seasons.

Cold Season ...	70·05	82·5	53·5	29·0	2·35	2
Hot do. ...	82·4	95·3	70·7	24·6	0·43	6
Rainy do. ...	76·6	89·6	68·0	31·6	19·78	53
Means... ...	76·35	89·1	64·1	25·0	22·56	61

MEAN Values of Mean Monthly Temperature at SHOLAPUR, *from Observations by Dr. J. C. Sylvester, from* 1853 *to* 1857, *inclusive.*

For Sholapur.	January.	February.	March.	April.	May.	June.	July	August.	September	October.	November.	December.	Annual Means.
1853 ...	74·5°	79·5°	86·0°	87·0°	91·0°	84·5°	79·0°	81·0°	80·0°	80·0°	77·0°	72·5°	81·0
1854 ...	77·0	76·5	83·0	91·0	91·5	87·0	79·5	81·0	79·0	78·0	76·5	73·0	81·0
1855 ...	73·5	78·0	83·5	88·5	91·0	86·5	82·0	80·5	81·0	81·5	76·5	72·5	81·1
1856 ...	75·0	80·0	84·5	92·0	88·0	82·5	82·0	82·0	78·5	78·0	75·0	72·5	80·8
1857 ...	75·5	79·5	83·5	85·5	85·5	82·5	81·5	79·5	79·0	78·0	72·0	70·0	79·3
Means...	75·0	75·6	84·0	85·8	88·8	84·6	80·8	80·8	79·4	79·0	75·4	72·0	80·6

Fahrenheit Scale.

RAINFALL at SHOLAPUR *from* 1853 *to* 1857, *inclusive, registered by Dr. J. C. Sylvester.*

At Sholapur.	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November.	December.	Total Yearly Fall.
1853 ...	...	0	0	0	0	3·43	4·81	11·23	4·87	0·20	3·80	0	28·34
1854 ...	...	0	0	0	1·12	2·60	7·56	3·81	8·25	6·46	·58	1·20	31·58
1855 ...	...	·33	·47	·10	·02	3·86	·55	·38	2·14	5·80	0	0	13·65
1856 ...	...	0	·92	·20	5·52	4·55	1·41	7·96	·89	2·21	·07	·04	23·77
1857 ...	·6	0	·37	·31	6·78	3·86	3·86	1·14	10·09	3·01	4·66	0	34·14
Means...	·1	·6	·35	·12	2·68	3·66	3·53	4·90	5·24	3·53	1·52	·24	26·29

Expressed in inches and cents.

Temperature and Rainfall at SHOLAPUR.

M ...	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Means.
... rature of Air ...	75·0	75·6	84·0	85·8	88·8	84·6	80·8	80·8	79·4	79·0	75·4	72·0	80·6
Ra ... l	0·1	0·6	0·35	0·12	2·68	3·66	3·53	4·90	5·24	3·53	1·52	0·24	26·47

The same shown by Seasons.

Cold	74·5	2·46
Hot	86·2	3·15
Rainy	80·9	20·86
Means... ..	80·5	26·47

118. From these tables it is seen, that the mean temperature on the Ghauts is 8·9 below that of the uplands at their base, and 11·6 below that of the plain beyond. It is 12·6 below that of the Konkan, as represented by Bombay, and in every element there is a proportional superiority. The excessive rainfall is of little consequence, for when this is falling the climate of the table-land is very enjoyable; if, however, the locality is screened, as at Panchgunny, it is admirably suited for permanent residence. As a sanitarium the place is deservedly in the foremost rank, and, height for height, there is no better. Dr. Murray has pointed out the physiological effects of the climate, as well with regard to diminished atmospheric pressure as to reduced temperature; and, dividing all diseases into febrile, inflammatory, organic, and functional, he says—

1. It is hurtful in continued and remittent fevers, and beneficial in fevers of an intermittent type.
2. It is hurtful in inflammatory diseases, whether acute or chronic.
3. It is hurtful in organic visceral diseases, whether the product of pre-existing inflammatory, or the result of non-inflammatory alteration of structure.
4. It is beneficial in a great proportion of functional diseases.
5. It is beneficial in convalescence from febrile and inflammatory diseases.

119. From these remarks it is seen how invaluable are the hills for those who cannot avail themselves of that more radical change where association is so powerful an auxiliary; and in addition there is their priceless worth for children. The comparative values of the hill and plain climates are shown in the following table, and in the one next following they are given for the different geographical divisions of the Presidency. In addition there are given, for each Collectorate, the mean annual temperature, the maximum, minimum, and range for ten years, and the rain fall for twenty years. These values are also shown for each month, and they are expressed by diagrams. Additional diagrams are given for independent points:—

TABLE showing Comparative Mean Annual Values of different Meteorological Elements at the undermentioned places in the Deccan.

	Barometer.	Temperature,—Fahrenheit. Of the Air.	Of Evaporation. *	Of Dew Point.	Maximum.	Minimum.	Range.	Of Cold Season.	Of Hot Season.	Of Rainy Season.	Rainfall.
... war ...	25·684	66·6	58·8	51·9	71·5	61·8	9·7	64·9	72·7	64·1	254·05
... .	27·907	76·0	69·0	64·8	82·8	69·3	13·5	72·2	84·0	74·5	39·2
... ...	27·465	75·9	67·8	62·9	80·8	70·7	10·1	73·6	82·7	73·7	41·5
... ...	*	75·9	*	*	88·7	63·8	24·9	70·0	82·4	76·6	22·5
... .	*	80·6	*	*	92·0	72·5	25·8	74·5	85·9	79·8	25·8

* These values are not obtainable.

TABLE showing Approximate Comparative Mean Annual Values of different Meteorological Elements in the different Geographical Divisions of the Bombay Presidency.

	Barometer.	Temperature,—Fahrenheit.									Rainfall.
		Of the Air.	Of Evaporation.	Of Dew Point.	Maximum.	Minimum.	Range.	Of Cold Season.	Of Hot Season.	Of Rainy Season.	
Deccan	27·686	77·1	68·4	63·8	86·0	71·6	18·6	72·57	83·75	76·15	25·08
Konkan	29·817	79·2	74·4	71·4	93·0	62·1	30·8	74·92	81·25	81·50	91·11
Guzerat	*	82·1	*	*	92·4	71·9	21·8	*	*	*	31·01
Sind...	*	87·1	*	*	102·4	53·5	48·9	*	*	*	3·00

* These values are not obtainable.

TABLE showing Mean Thermometric Values and Rainfall for each Collectorate for 10 *years.*

		Temperature,—Fahrenheit.				Rainfall.
		Means.	Maximum.	Minimum.	Range.	
Deccan.	Khandesh	80·34	93·12	67·56	25·56	20·93
	Ahmadnagar	78·49	89·78	67·19	22·59	26·03
	Puna	77·49	86·59	68·38	18·21	25·09
	Satara	76·29	86·78	65·81	20·97	40·27
	Sholapur	77·26	85·19	69·33	15·86	20·55
	Belgaum	77·24	83·26	71·23	12·03	24·77
	Dharwar	76·96	87·03	66·88	20·15	17·96
	Mean...	77·72	87·39	68·05	19·34	25·08
Konkan.	Ratnagiri	81·16	87·18	75·13	12·05	108·32
	Thana...	80·76	90·63	70·89	19·74	91·94
	Mean...	80·96	88·90	73·01	15·89	100·13
Guzerat.	Surat	82·18	91·94	72·42	19·52	46·26
	Broach	77·59	84·75	70·44	14·31	27·47
	Kaira	81·35	92·52	70·17	22·35	27·45
	Ahmadabad	82·67	93·22	72·12	21·10	22·89
	Mean...	80·95	90·61	71·29	19·32	31·02
Sind.*	Karachi	...	...	...	...	4·92
	Haidarabad	...	...	...	...	7·54
	Thar and Parkar ...	...		...	...	.....
	Shikarpur	...	...	....	...	2·66
	Upper Sind Frontier...	...	...	...	...	.....
	Mean...	...	...	...	...	3·02

* No temperature returns are obtainable.

A Synopsis of Fifteen Years' Meteorological Observations (from 1st January 1829 to 31st December 1843, inclusive), on the Mahableshwar Hills, Lat. 17° N., Long. 73° 30' E., Height above the Sea 4,500 feet.—By J. Murray, Esq., Surgeon. Presented by the Medical Board, May 1844.

MONTHS.	Out-door Atmospheric Temperature in the Shade. Means. Mean Temperature.	Mean Daily Variation of Temperature.	Mean Daily Maximum Temperature.	Mean Daily Minimum Temperature.	Mean Temperature at 9 A.M.	Mean Temperature at 9 P.M.	Difference of Mean Temperature of successive months.	Out-door Atmospheric Temperature in the Shade. Extremes. Extreme Daily Range of Temperature.	Extreme Monthly Range of Temperature.	Extreme Maximum Temperature.	Extreme Minimum Temperature.	Out-door Atmospheric Temperature in the Sun. Means. Mean Temperature in Sun at mid-day.	Mean amount of Solar Radiation at mid-day.	Mean Temperature in Sun at 9 A.M.	Mean amount of Solar Radiation at 9 A.M.	Out-door Atmospheric Temperature in the Sun. Extremes. Extreme Temperature in Sun at mid-day.	Extreme amount of Solar Radiation at mid-day.	Extreme Temperature in Sun at 9 A.M.	Extreme amount of Solar Radiation at 9 A.M.	Atmospheric Pressure. Means. Mean Daily Height of Barometer.	Mean Daily Range of Barometer.	Mean Daily Maximum Height of Barometer at 10 to 11 A.M.	Mean Height of attached Thermometer.	Mean Daily Minimum Height of Barometer at 4 to 4½ P.M.	Mean Height of attached Thermometer.	Extreme Monthly Range of Barometer.	Atmospheric Humidity. Depression of Thermometer. Means. Mean Depression of Wet Thermometer.	Extreme Daily Depression of Wet Thermometer.	Evaporation. Means. Mean Monthly Evaporation.	Extreme Daily Evaporation.	Rain. Means. Mean Monthly Rainfall.	Mean No. of Rainy Days.	Mean Day Fall.	Mean Night Fall.	Extremes. Extreme Daily Rainfall.	Extreme Monthly Rainfall.	Extreme Annual Rainfall 1842.	Atmospheric Currents. Winds. Direction.	Force.	Appearances of Sky, &c.
January.. ..	64·0	13·2	70·6	57·4	63·8	63·3	0·8	21·0	30·5	79·5	45·0	96·0	24·2	80·5	15·3	116·0	41·0	98·0	30·0	25·737	0·158	25·771	68·1	25·703	69·2	0·204	9·8	17·2	12·45	0·67	0·05	½	0·04	0·03	0·37	0·66	0·66	Easterly...	Moderate.	Clear.
February ..	66·3	13·9	73·3	59·4	68·3	65·0	2·2	23·8	32·1	85·5	46·0	100·7	25·3	84·6	15·7	117·0	41·8	101·0	31·5	25·765	0·087	25·809	68·7	25·722	69·6	0·374	13·0	24·0	14·08	0·83	0·25	½	0·05	0·03	1·35	2·05	..	E.N.E.N, N.W.	....	Do.
March	71·5	14·1	78·6	64·5	72·9	66·1	5·2	23·5	38·0	89·0	49·5	107·3	27·5	93·0	19·3	127·0	44·8	107·9	33·0	25·688	0·094	25·735	73·6	25·641	75·3	0·222	15·7	24·6	18·66	0·95	0·15	1	0·03	0·06	0·68	0·68	0·02	N.E.N, N.W.	....	Do.
April	74·5	13·9	81·5	67·6	77·5	72·0	3·0	22·0	34·5	92·0 (1842.)	58·0	106·0	22·8	96·5	18·1	125·0	39·5	116·0	36·5	25·667	0·092	25·713	70·9	25·621	78·1	0·214	15·4	26·3	18·59	0·99	1·31	4	0·95	0·20	1·70	4·02	...	....	....	Do. with occasional clouds.
May	72·4	12·9	78·9	66·0	73·5	67·0	2·1	22·0	32·0	90·0	57·5	96·8	18·5	88·7	16·4	124·0	38·5	110·0	30·2	25·643	0·085	25·686	74·7	25·601	76·4	0·240	9·5	26·0	13·31	0·94	3·31	6	2·24	1·18	4·42	10·03	3·74	....	....	Clear with clouds and frequent fogs latter half.
June	66·3	5·9	69·3	63·4	67·7	64·3	6·1	18·5	25·5	84·0	58·0	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	25·664	0·062	25·695	70·6	25·633	70·7	0·328	2·6	7·0	2·61	0·69	46·53	24	19·67	19·33	11·32	68·87	37·86	W.S.W.	....	Foggy.
July	63·2	2·9	64·7	61·8	64·4	62·0	3·1	12·7	18·5	73·81	51·5	..	..	..	..	..	..	..	..	25·609	0·017	25·609	67·9	25·592	68·8	0·389	1·8	5·2	0·44	0·17	92·10	30	45·13	49·22	12·74	134·42 (1840.)	117·76	....	High ...	Continued dense fogs.
August	63·2	2·6	64·5	61·9	63·8	61·5	..	11·1	13·0	70·8	53·0	..	..	..	..	..	..	..	..	25·647	0·043	25·669	66·8	25·626	67·4	0·250	1·7	7·7	0·36	0·09	72·35	30	36·65	37·16	12·67	107·94	77·75	....	....	Do. do.
September ..	63·9	3·9	65·9	62·0	65·1	62·5	0·7	14·0	17·0	77·0	56·0	..	..	..	..	..	..	..	..	25·524	0·373	25·711	67·6	25·338	67·9	0·410	2·7	8·5	1·91	0·40	31·32	24	21·71	17·65	13·06	65·97	56·60	....	Moderate.	Frequent light fogs.
October	66·6	9·8	71·5	61·7	68·2	65·2	2·7	17·5	23·0	78·5	54·0	98·2	25·8	82·4	14·6	115·0	39·0	98·0	34·1	25·810	0·130	25·830	66·3	25·790	68·2	0·218	6·4	16·0	9·77	0·66	4·58	8	3·64	1·20	2·44	9·29	7·48	Variable.	Light	First half cloudy with drifting fogs; last half clear.
November ..	64·4	11·5	70·2	58·7	64·5	62·5	2·2	16·5	23·0	75·0	51·5	94·8	24·0	79·1	14·1	115·0	43·0	92·5	29·5	25·733	0·152	25·764	66·8	25·702	67·3	0·334	7·7	15·5	11·15	0·79	2·07	3	0·93	1·44	4·32	11·07	4·00	Easterly...	High ...	Clear.
December ..	63·2	12·0	69·2	57·2	62·5	60·5	1·2	19·0	27·5	76·0	48·5	95·1	25·2	76·5	13·6	111·0	40·0	89·5	27·5	25·739	0·082	25·779	66·2	25·699	66·9	0·226	7·8	16·7	11·71	0·66	0·05	½	..	0·01	0·35	3·11	..	.....	....	Do.
Total Sums...	799·5	116·6	858·2	741·6	812·2	771·9	29·4	..	...	..	..	795·4	193·3	681·3	127·1	..	...	..	...	308·217	1·375	308·771	834·2	307·668	845·8	...	94·1	...	...	...	...	...	...	...	...	...	...	....	....	
Divide by..	12	12	12	12	12	12	12	...	...	...	...	8	8	8	8	...	...	...	...	12	12	12	12	12	12	...	12	...	...	...	...	...	...	...	...	...	....	....	
Quindecennial Means and Extremes.	66·6	9·7	71·5	61·8	67·6	64·3	2·4	23·8	38·0	92·0	45·0	99·4	24·1	85·1	15·8	127·0	44·8	110·0	36·5	25·684	0·114	25·730	69·5	25·639	70·4	0·410	7·8	26·3	115·04	0·99	254·05	131	131·04	127·51	13·06	134·42	305·27	....	....	

THE SAME SHOWN BY DR. MURRAY'S SEASONS.

SEASONS.																																							
Cold.—Oct. 1st to Feb. 28th.	64·9	10·08	70·96	58·88	65·46	63·30	1·84	19·36	27·22	78·90	49·0	96·96	24·90	80·62	14·66	114·80	40·96	95·80	30·52	25·757	0·122	25·791	67·22	25·723	68·24	0·271	8·94	17·88	11·83	0·73	..	..	...	...	..	..	...	....	....	
Hot.—March 1st to May 31st.	72·7	13·63	79·66	66·03	74·63	68·36	3·43	22·50	34·83	90·33	54·26	103·53	22·93	92·73	17·96	125·33	40·93	109·00	33·23	25·666	0·090	25·711	75·07	25·554	76·60	0·225	13·53	25·63	16·85	0·96	..	..	...	...	..	...	...	....	....	
Rainy.—June 1st to Sept. 30th.	64·1	3·82	66·10	61·52	65·25	62·57	2·48	18·50	18·50	76·40	71·16	...	...	...	...	...	...	..	...	25·609	0·124	25·671	68·22	25·547	68·70	0·342	2·20	7·10	1·33	0·31	...	...	...	..	...	..	...	....	....	
Means..	67·2	9·18	72·24	62·14	68·45	64·74	2·58	20·12	26·85	81·88	58·14	66·83	15·94	57·78	10·87	80·04	27·29	68·27	21·25	25·031	0·112	25·724	70·17	25·608	71·18	0·279	8·22	16·87	10·00	0·67	...	...	...	..	..	...	...	....	....	

SUMMARY of the Principal Characters of the MAHABLESHWAR *Climate, as deduced from Fifteen Years' Observations.—By J. Murray, Esquire.*

PRESENTED BY THE MEDICAL BOARD, MAY 1844.

Mean annual out-door Temperature in the shade		66·6
„ daily variation of Temperature in the shade		9·7
„ „ Maximum Temperature in the shade		71·5
„ „ Minimum Temperatue in the shade		61·8
„ „ Temperature at 9 o'clock A.M., in the shade		67·6
„ „ Temperature at 9 o'clock P.M., in the shade		64·3
„ Temperature of the cold season in the shade		64·5
„ „ „ hot season in the shade		71·1
„ „ „ rainy season in the shade		64·1
Extreme daily range of Temperature observed in 15 years		23·8
„ monthly range of Temperature observed in 15 years		38·0
„ yearly range of Temperature observed in 15 years		43·1
„ range of Temperature recorded in 15 years		47·0
„ Maximum Temperature observed in 15 years (April 7, 1842)		92·0
„ Minimum Temperature observed in 15 years (January 29, 1829) ...		45·0
Difference of mean Temperature of successive months		2·4
„ „ „ „ seasons		4·6
„ „ „ „ years		0·8
„ „ „ of the coldest and hottest months of the year ...		11·3
„ „ „ „ cold and the hot season		6·6
„ „ „ of each season and the annual mean		3·0
Mean daily Temperature in the sun at mid-day during the fair season		99·4
„ amount of Solar radiation at mid-day during the fair season ...		24·1
Extreme Temperature in the sun at mid-day during the fair season		127·0
„ amount of Solar radiation at mid-day during the fair season		44·8
Mean daily height of Barometer	inches.	25·684
Mean daily range of Barometer	„	0·114
Extreme monthly range of Barometer.	„	0·410
Mean annual fall of Rain	„	254·05
„ „ day fall of Rain	„	131·04
„ „ night fall of Rain...	„	127·51
„ annual number of Rainy Days	„	131·00
Extreme annual fall of Rain (1842)	„	305·27
„ monthly fall of Rain (July 1840)	„	134·42
„ daily fall of Rain (September 2nd 1833)	„	13·06
Mean daily depression of Wet Bulb Thermometer		7·8
„ „ Thermometer during the fair season		10·5
Extreme daily depression of Wet Bulb Thermometer		26·3
Mean annual Evaporation	inches.	115·04
Extreme daily Evaporation	„	0·99

STATEMENT showing the Mean Maxima and Minima of the THERMOMETER *at the undermentioned places, from January* 1852 *to September* 1861, *inclusive.*

Divisions.	No.	Districts.	Calculated from Observations during ten years.																														Calculated from Observations during nine years.							
			January.				February.				March.				April.				May.				June.				July.				August.				September.				October.				November.				December.			
			Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.
Deccan.	1	Khandesh (Dhulia)	68	82·4	52·6	30·8	73·9	91·3	56·5	34·8	83·2	99·1	67·4	31·7	89·0	103·1	75·0	28·0	93·2	105·6	80·7	24·9	88·9	101·9	75·9	26·0	83·2	91·8	73·7	17·1	82·6	90·6	74·1	15·9	81·6	89·8	73·4	16·4	78·5	90·4	66·5	23·8	75·4	87·5	·4	37·9	69·1	83·7	54·4	29·3
	2	Násik *	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3	Ahmadnagar ...	67·3	79·9	54·6	25·7	73·3	87·9	59·5	27·8	79·9	94·2	65·6	28·6	85·9	99·2	72·6	26·6	89·1	101·8	76·4	25·4	86·0	97·1	75·0	22·1	82·6	90·9	74·2	16·7	80·9	88·3	73·4	14·9	79·2	86·8	71·6	15·2	76·4	87·2	65·4	21·8	73·9	84·6	61·0	23·6	68·7	80·3	57·0	23·3
	4	Poona...	69·7	81·8	57·6	24·2	76·4	86·6	66·2	20·4	81·5	92·5	70·5	22·0	84·9	95·9	74·0	21·9	87·0	96·2	77·6	18·4	81·4	89·4	73·3	16·1	77·3	82·0	73·1	8·9	75·9	79·9	71·9	8·0	76·6	82·8	70·5	12·3	70·8	85·5	68·0	17·5	72·6	84·4	60·7	23·7	70·5	83·1	57·7	25·4
	5	Sátára	71·3	84·2	58·3	25·9	74·4	87·6	61·2	26·4	80·4	92·3	68·5	23·7	83·4	96·3	70·4	25·9	83·3	95·1	71·4	23·7	80·1	89·4	70·9	18·5	76·5	81·0	69·9	11·1	74·3	79·6	69·1	10·5	76·1	83·2	67·1	16·1	74·8	83·2	64·4	20·8	74·4	82·6	66·0	16·6	71·4	80·6	62·9	18·6
	6	Sholápur	70·9	80·7	61·1	19·6	76·2	86·7	65·6	21·1	80·2	91·3	69·1	22·2	83·5	93·3	73·2	20·6	84·1	93·5	74·6	18·9	80·4	87·5	73·3	14·2	76·4	80·9	72·0	8·9	75·7	79·2	72·1	7·1	77·1	82·5	71·8	10·7	76·9	82·8	71·1	11·7	74·3	81·3	67·2	14·1	72·6	79·4	65·7	13·7
	7	Belgaum	74·6	81·6	67·5	14·1	78·3	86·4	70·1	16·3	80·3	88·6	72·3	16·3	88·1	91·2	75·0	26·2	84·7	89·9	75·5	14·4	79·5	84·0	75·0	9·0	74·4	77·4	71·4	6·0	75·2	78·6	71·9	6·7	75·9	79·9	71·8	8·1	76·1	80·8	71·3	9·5	74·3	81·3	67·2	14·1	72·6	79·4	65·7	13·7
	8	Dharwar	73·7	85·6	61·7	25·9	77·9	90·5	65·3	25·2	80·3	94·1	66·5	27·6	83·8	97·6	70·1	27·5	82·6	94·9	70·4	24·5	78·6	87·4	69·9	17·5	74·3	79·2	69·3	9·9	74·6	80·6	68·5	12·1	75·5	82·7	68·3	14·4	75·9	84·2	67·7	16·4	73·7	84·4	62·8	21·6	72·3	82·7	61·8	20·9
	9	Kaladgi *																																													
Konkan.	10	Kanara *																																													
	11	Ratnágiri	76·3	82·6	69·9	12·7	77·9	83·6	72·2	11·4	79·8	86·7	72·8	13·9	*b*84·3	*b*89·3	*b*79·2	10·1	84·8	*b*89·4	*b*80·2	9·2	*a*83·5	*a*89·0	*a*77·8	*a*11·1	*b*80·1	*b*83·3	*b*76·7	*b*6·5	*b*79·1	*b*83·3	*b*75·0	*b*8·3	*b*76·7	*b*83·4	*b*70·0	*b*13·4	80·5	85·5	75·0	10·5	*a*79·4	*a*85·0	*a*73·7	*a*9·3	*a*78·4	*a*84·8	*a*71·8	*a*13·0
	12	Kolába *	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	13	Bombay City * ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	14	Thána	73·6	86·6	60·6	26·0	77·4	92·3	62·4	29·9	82·7	99·0	66·4	32·6	*c*88·1	*c*98·8	*c*77·5	*c*20·8	89·3	98·5	80·2	18·3	86·2	94·8	77·6	17·3	79·4	82·7	76·1	6·6	80·0	84·2	75·8	8·4	80·2	85·3	75·1	10·2	80·8	90·4	71·2	19·2	75·7	89·1	62·2	26·8	73·6	85·7	61·5	24·2
Gujerat.	15	Súrat...	74·2	87·7	60·7	27·0	77·6	91·0	64·3	26·7	83·9	97·2	70·7	26·5	84·5	99·2	76·8	15·4	89·8	99·7	80·0	19·7	86·7	93·8	79·6	14·2	83·7	89·2	78·2	11·0	82·8	87·3	78·4	8·9	83·3	89·3	77·0	12·5	82·8	92·0	73·4	18·6	78·1	89·5	66·5	23·0	75·2	87·1	63·3	23·8
	16	Broach	69·5	88·0	50·2	37·1	80·4	93·3	67·5	25·8	88·6	101·2	76·0	25·2	94·3	104·9	83·6	21·3	95·9	105·1	86·6	18·5	91·3	100·3	82·3	18·0	83·3	92·8	73·7	19·1	85·1	91·0	79·2	11·8	85·8	92·9	78·7	14·2	86·4	93·2	79·4	13·8	80·4	89·8	70·8	19·0	75·6	85·6	65·4	20·2
	17	Kaira...	69·9	85·2	54·6	30·6	72·2	87·0	57·3	29·7	83·3	97·6	69·0	28·6	88·2	102·8	73·7	29·1	92·9	104·1	81·8	22·3	90·9	101·7	80·2	21·5	86·0	94·7	77·3	17·4	83·3	88·9	77·7	11·2	84·7	93·5	75·9	17·6	76·6	81·6	71·6	10·0	76·9	88·2	65·5	22·6	71·1	84·8	57·4	27·4
	18	Panch Mahals * ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	19	Ahmadábád... ...	69·9	82·0	56·0	26·0	74·5	88·3	60·8	27·5	80·3	97·3	68·3	34·0	89·7	102·1	77·4	24·7	94·2	105·1	83·2	21·9	93·9	105·1	82·6	22·5	88·0	96·5	79·5	17·0	85·2	91·5	78·9	12·6	85·5	92·7	78·4	14·3	82·1	93·4	70·8	22·6	77·1	89·7	64·3	25·4	70·5	82·8	58·1	24·7

* No available returns—nor for SIND.

Fahrenheit's Scale.

a for 8 years only. *b* for 9 years only. *c* for 9 years only.

STATEMENT showing the Mean Monthly RAINFALL *at the undermentioned places from January* 1852 *to September* 1861, *inclusive.*

Divisions.	No.	Districts.	Average of ten years.									Average of nine years.			Mean Annual fall.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
			Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	
Deccan.	1	Khandesh (Dhulia)	0·04	0·05	0·08	0·13	0·51	5·93	4·01	2·79	3·81	1·58	0·14	0·19	18·69
	2	Kasik*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3	Ahmadnagar	0·17	0·06	0·06	0·15	1·97	5·05	2·66	3·74	6·38	4·33	0·33	0·80	24·30
	4	Poona*	.....	.....	.....	0·13	0·26	5·09	8·42	3·92	4·64	3·90	0·27	.....	24·85
	5	Satara	0·03	.....	0·07	0·69	2·87	7·02	16·41	7·85	3·52	4·90	0·58	0·42	43·18
	6	Sholapur	0·09	0·05	0·27	1·18	2·20	4·92	4·67	4·60	6·42	4·23	1·29	0·53	30·46
	7	Belgaum	0·05	.....	0·46	1·37	4·59	6·36	15·55	8·67	3·54	4·65	1·13	0·04	46·32
	8	Dharwar	0·06	0·03	0·14	1·19	5·28	4·19	6·71	4·45	3·07	6·02	0·78	0·10	31·39
	9	Kaladgi*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Konkan.	10	Kanara*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	11	Ratnagiri*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	12	Kolaba*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	13	Bombay City	.....	.....	.....	0·02	0·53	20·44	21·56	10·72	9·62	1·93	0·21	0·13	63·08
	14	Thana	.....	.....	.....	0·03	0·58	26·65	35·65	21·01	15·13	2·35	0·49	0·02	98·27
Guzerat.	15	Surat	.....	.....	.....	.....	0·05	0·43	4·82	7·20	5·70	0·76	0·02	0·14	34·15
	16	Broach	0·01	.....	0·26	0·04	0·01	8·24	14·97	8·33	7·03	1·12	0·02	0·16	41·60
	17	Kaira	.....	.....	.....	.....	0·46	4·72	15·88	7·15	4·82	0·24	.....	.....	33·78
	18	Panch Mahals*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	19	Ahmadabad	0·11 A	A	A	A	0·13 A	6·03 A	16·20 A	8·32 A	4·04 A	0·20 B	0·04 B	B	37·35 B

* No available returns—nor for SIND.

{ A.—For nine years only.
{ B.—For eight years only.

Expressed in inches and cents.

TABLE showing the Mean Monthly RAINFALL *at the several Collectorates of the* BOMBAY PRESIDENCY *from* 1862 *to* 1871, *i. e.*, *compiled from the Rain Returns as published in the 'Government Gazettes' for those years.*

	No.		Average for Ten Years.												Mean.	
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December		
			Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	
Deccan.	1	Khandesh	·42	...	...	...	·13	3·86	5·79	5·23	4·29	·87	·21	·13	20·93	21·76
	2	Nasik—A ...	·78	...	...	·06	·26	5·07	7·97	5·02	5·22	3·65	·90	·53	29·46	
	3	Ahmadnagar ...	·60	...	·01	·03	·25	5·42	5·10	6·82	5·05	2·05	·34	·06	26·03	
	4	Poona	·56	...	·01	·03	·36	5·33	5·94	6·84	3·41	2·13	·28	·20	25·09	
	5	Satara	·44	...	·09	·22	·58	9·10	12·08	10·18	4·68	2·20	·44	·26	40.27	
	6	Sholapur	...	...	...	...	·45	3·86	3·13	4·60	5·85	2·43	·23	...	20·55	
	7	Belgaum	·13	...	·15	·29	·98	5·57	6·36	4·75	3·27	2·79	·22	·26	24·77	
	8	Dharwar	·15	...	·09	·23	·82	4·02	3·82	3·47	2·90	2·06	·21	·19	17·96	
	9	Kaladgi—B ...	·09	...	·06	·16	·49	2·90	2·55	4·07	4·66	2·23	·18	·43	17·82	
Konkan.	10	Kanara—C ...	·34	...	·30	·28	1·10	15·17	31·02	26·52	11·54	2·98	·46	·15	89·86	91·80
	11	Ratnagiri	·70	...	...	·05	·36	30·38	36·69	25·42	12·27	2·11	·25	·09	108·32	
	12	Kolaba—A ...	1·58	...	...	·18	·63	15·02	33·67	19·15	19·21	4·69	·32	·27	94·72	
	13	Bombay City ...	·23	...	...	·01	·20	19·70	24·83	17·89	11·06	·06	·18	·01	74·17	
	14	Thana	·17	...	...	·03	·25	20·62	33·17	23·87	11·08	2·54	·15	·06	91·94	
Guzerat.	15	Surat	·01	·02	·01	...	·25	8·56	14·97	14·27	6·92	·99	·19	·07	46·26	33·24
	16	Broach	...	...	·02	·05	·23	5·20	8·25	8·83	4·28	·43	·16	·02	27·47	
	17	Kaira	...	...	...	·03	·15	4·42	9·97	8·14	4·29	·36	·06	·03	27·45	
	18	Panch Mahals—C ...	...	·05	·01	·03	·02	4·78	10·97	10·59	4·55	·97	·14	·03	32·14	
	19	Ahmadabad ...	...	...	·04	·01	·31	3·55	7·52	7·28	3·85	·18	·14	·01	22·89	
Sind.	20	Karachi—C ...	·22	·09	·22	...	·02	·67	1·84	·98	·84	...	·04	...	4·92	3·02
	21	Haidarabad—C ...	·16	·10	·12	·02	·03	·86	1·41	4·15	·68	·01	...	...	7·54	
	22	Thar and Parkar ...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	23	Shikarpur—B ...	·18	·05	·55	...	...	·67	·42	·73	·06	...	...	...	2·66	
	24	Upper Sind Frontier	...	...	...	...	...	...	...	...	...	...	...	...	...	

A for 3 years only.
B for 7 ditto.
C for 9 ditto.

FORESTS.

120. Apart from their economic value, trees have so sensible and direct an influence upon the temperature of both earth and air, and upon rainfall, that their presence or absence will change the climate of an entire district. The amount of carbon inhaled by them, and the quantity of oxygen exhaled cannot but influence the atmosphere of the locality, whilst the extent of this influence may be estimated by remembering, that the plane of every leaf is an absorbing and evaporating surface. As mere shade they temper heat, and, by acting as a screen between earth and sky, they retard the radiation of heat and mositure. Their roots, by binding the soil, prevent its being washed away from uplands, and in the shape of humus they restore to the earth its expended richness. Whatever may have been the former condition in this Presidency as regards its wood, it is beyond a doubt that extensive tracts have suffered a denudation which might have been avoided. Obviously the timber-yielding forests are within the Ghaut area, and the cross ranges of the Godavery and Tapti basins; but in all directions there are now being fostered babul and other plantations, which already give large supplies of rafters, firewood, &c., &c.

TABLE showing Approximate Forest Areas in the BOMBAY PRESIDENCY.

		Areas.	
		In Acres.	In Square Miles.
DECCAN.	Khandesh	174,638	272·7
	Nasik	278,535	435·2
	Ahmadnagar	147,548	230·6
	Poona	148,361	231·8
	Satara	243,355	380·3
	Sholapur	.....	.....
	Belgaum	262,172	409·6
	Dharwar	50,081	78·3
	Kaladgi	100,354	156·8
	Total.	1,405,044	2,195·3
KONKAN.	Kanara	2,013,866	3146·7
	Ratnagiri	4,332	6·8
	Kolaba	187,126	292·2
	Thana	471,275	736·4
	Total	2,676,600	4182·1
GUZERAT.	Surat	27,183	42·5
	Broach	.....	.....
	Kaira (Panch Mahals)	4,906	7·6
	Ahmadabad	.....	.....
	Total	32,089	50·1
SIND.	Karachi	86,852	135·7
	Haidarabad	121,975	190·6
	Shikarpur	143,214	223·8
	Total	352,041	550·1
Deccan		1,405,044	2,195·3
Konkan		2,676,600	4,182·1
Guzerat		32,089	50·1
Sind		352,041	550·1
	Total	4,465,774	6,977·6

WATER SUPPLY.

121. Under this head will be noticed the supply for ordinary house purposes only, and, leaving out that obtained from rivers and running streams, it must be taken under the two heads of *storage* and *distribution*.

122. From returns submitted to Government by the Revenue Commissioners it appears that, out of a total of 24,189 villages in the Deccan, the Konkan, and Guzerat, 4,948 have wells for both higher and low castes, and 7,663 have them for the higher castes only. In 6,951 the supply is drawn from rivers and running streams, in 1,464 from tanks, and in 3,163 from jharas or holes dug in the dry beds of nullahs. For 12,611 villages the supply is supplemented by wells, and for 11,578 it is from other sources.

123. KHANDESH.—In this district the river Tapti, which traverses it from S.E. to N.W., is a source of supply, more or less, to 10 out of the 16 talookas, and the water is much esteemed. There are minor streams, such as the Poorna, Suki, Gul, Aner, Waghur, Girna, Tituri, Dongri, Bori, Panjra, and the Borai. In most of these the supply is perennial. The quality of the water is everywhere held to be good, except in the Gul and Aner. In those villages which are distant from rivers, there are wells having an average depth of from 30 to 40 feet. The yield is fairly good as to quantity and quality, but it is held to be inferior to the river water, and is somewhat brackish in the more eastern talookas. The principal tanks are the Lasur in Chopra, the Hartala in Bhosawal, the Mokle near Dhulia, and the Meheri which supplies the town of Julgaum. The first three are intended for irrigation, but the water is of excellent quality. From the Meheri tank it has been proposed to lay pipes for the supply of the town of Dhulia. There are minor tanks and wells, and jharas which yield for a part of the year only; and it is to be feared that, in some localities during the hot weather, the supply is both scanty and bad.

124. NASIK.—In this Collectorate the Tapti, the Girna, and the Godavery, with their tributaries, supply 623 villages, and in 249 it is supplemented by wells. In 110 villages it is obtained, during April and May, from jharas. In 387 villages the higher castes are wholly dependent upon wells, whilst the low castes possess only the precarious yield from springs, quarry pits, &c. Only 6 villages are dependent upon storage in tanks. In the town of Nasik and at Yeola an additional supply is brought in by masonry ducts, and an extension of the system is in contemplation.

125. AHMADNAGAR.—This district has the benefit of the Godaveri, the Prawera, and the Moola, with their tributaries, and the supply is ample and good. The city of Ahmadnagar and the Cantonment have water brought in by old aqueducts, and in most of the villages there are good masonry wells; but very many are furnished with steps leading down to the water, and there is much pollution in consequence. In the Dang villages of the Ankola talooka the supply is precarious, and the wells are bad.

126. POONA.—The chief rivers in this Collectorate are the Bheema, Moota, Mola, Neera, Meena, Pushavati, and Indrayani. The water of all these is good for all purposes, and they are all of them sources of supply to the many villages along their banks. The average depth of wells in this district is about 30 feet, and more than half of them yield a sufficient supply all the year round. The water is somewhat hard, but is of good quality; now and then the yield is brackish. There are not many large tanks in good order. The supply for the city was mainly derived from the Kartruz tank, and that for the cantonment from the river by the Jamsetjee Bund, but *below* the city. All this has now been changed by the construction of the magnificent reservoir at Kurruckwasla, which will supply both places.

127. SATARA.—The Krishna, the Yena, the Koina, the Wasna, the Moun, the Yerla, the Oormoree, the Torlee, the Neera, and the Warna, with innumerable

streams and tributaries, all afford an excellent and ample supply. For the town of Satara it is led by ducts from the summit of Ewteshwar and the Mahadwun tank near the foot of the hill. This, unfortunately, is not available for the cantonment, where the yield from the wells is somewhat hard. For Karar there are reservoirs supplied from the Krishna, and it is intended to extend and improve them. In 13 villages only is the storage in tanks. Irrigation works have been completed at Mynee, Koorsee, Gondowla, Yerla, and Reveree, and water is invariably drawn from the reservoirs and canals. Other and more extensive schemes are in contemplation.

128. SHOLAPUR.—The return for this Collectorate is the only one that gives the actual number of wells. For the other districts, and for the two Revenue Divisions, it is shown that so many villages possess wells for both higher and low castes, and so many have them for higher castes exclusively. The number of wells is nowhere shown, nor do we know the village populations; so beyond the general statement that there are those sources of supply, there is nothing to show its relation to the demand. In the Sholapur Collectorate 648 villages are returned as having amongst them 2,726 wells, and by the Census the collective population is 662,986. Of these wells 676 have steps leading down to the water, 211 are without them, and 1,839 are those deep draw-wells of narrow diameter, called *Ad*. In 57 sources of supply, it is stated that guinea-worm is "generally prevalent," in 375 it is slightly so, and 216 are free from it. Whether rightly or wrongly, there is a strong impression that this parasite is bred, or is more generally found, in those wells which have steps leading down to the water, and which, in consequence, are more liable to pollution. Whenever there is a choice, the water of these wells is avoided for drinking, and the authorities everywhere discourage their construction. In 89 villages there are wells for both higher and low castes; in 276 they are for higher castes only; in 261 the supply is drawn from rivers and running streams; in 35 resort is had to jheras, and in 5 it is stored in tanks. There is here a total of 686 villages, but it may be assumed that in very many there is more than one source of supply. It is to be hoped that ere long the town of Sholapur will be supplied from the Ekruk reservoir.

129. BELGAUM.—In the talookas of Belgaum, Bidi, Chikodi, and Sumpgaum the supply is plentiful and good, both by rivers, streams, and wells. In the eastern talookas of Athni, Gokak, and Parsgad the wells are deep, and the water is brackish, but there are the Krishna, the Ghatpurba, the Malpurba, and the Markundi rivers. An irrigation scheme is under consideration for leading canals from the Ghatpurba into the Gokak talooka, and it is in these eastern districts that works are yet needed for improving the supply.

130. DHARWAR.—This district is less favoured as regards its water-supply, being mainly dependent upon reservoirs. The wells are from 60 to 90 feet deep, and in most localities the yield is brackish. The Malpurba, Toongabudra Kumudwati, Dharna, and Wurdah rivers afford a good supply in their respective courses; but, as a whole, much remains to be done.

131. KALADGI.—This Collectorate is intersected by the Krishna, the Ghatpurba, the Malpurba, and the Done. The Bheema runs on the northern portion, and with its tributaries supplies most of the Indi talooka and the southern part of the Bagewady talooka. The water of the Done, which forms the northern boundary of this talooka, is brackish, and the yield from wells in its vicinity is also brackish. The supply for the Modehabad talooka is from the Krishna, supplemented by wells and jharas. In the Sindi Talooka it is deficient, both in quantity and quality; not more than half the villages in this talooka are adequately supplied. In the Bijapur taluka the supply is chiefly from the Krishna, and nullahs. In Bagulkote talooka it is from the Krishna and the Ghatpurba. There are also good wells in most of the villages. In a few places of the Badami talooka there are tanks, but in the southern portion the villages depend

chiefly upon the Malpurba. In the hilly portions of this talooka there are springs. Both in this and the Hungud talookas the supply is precarious during the hot season; and if there is no positive want, there is much inconvenience.

132. KANARA.—In this Collectorate the supply is derived from rivers, tanks, and wells; and the last source is held to be the best.

133. RATNAGIRI.—In noticing the water-supply of this district, the Collector has divided it into five longitudinal belts. In the first are the sea-coast villages, and here the supply is mostly from wells; the yield being brackish, but not unwholesome. Some of the coast towns, such as Dabhol, Murud, Anjurle, Kelshi, and Velar, are on marshy reclaimed lands, and are thickly studded with gardens which are irrigated by wells, and their water is polluted. In these places the people have themselves recognised the necessity for improvement, and it has already been effected in Anjunwell, Bankot, and Dhabol. In the second or laterite belt the wells are mostly fed by fresh-water springs. In the third belt it is also from wells and running springs led down by open channels; it is abundant and wholesome. In the fourth belt, the exclusively basaltic formation, the supply is both defective and deficient. The villages here are chiefly dependent upon jharas. The fifth belt is along the foot of the Ghauts, and there are good wells supplemented by jharas. Throughout the whole of this Collectorate the people are themselves fully alive to the value of a good water-supply, and no opportunity is lost of effecting improvements.

134. KOLABA.—The coast villages of this Collectorate are worse off than those more inland, and the yield of the wells is somewhat brackish. At the foot of the Ghauts the supply is spoken of as being defective. In the Mangaum talooka it is brackish. In the Mahad talooka it is plentiful and good.

135. THANA.—The villages of this district are divided, like those of the other coast Collectorates, into those near the sea, those on tidal creeks, and those more inland. It is only in the last-named class, that the general supply is deficient; but, as Mr. Robertson has pointed out, this is not so much owing to the absence of water as to the poverty of the people. In most instances wherever a well is sunk water is obtainable; and, considering the nature of the country, and the immense annual monsoon rainfall, there are peculiar opportunities for storage. The yield of the coast village wells is somewhat brackish, but not unwholesome. It is a painful fact, that in Thana itself, the chief town of the district, there is hardly one single well or tank, of which the water is not thoroughly impure; and in very many there is almost a certainty of guineaworm, if it be used or taken.

136. SURAT.—This district is divided by the Collector into three longitudinal belts. The villages in the first, that nearest the sea, are mainly dependent upon wells, and the yield is not unwholesome, though brackish. In the second belt, the richest tract of the Collectorate, the wells are mostly fed by fresh-water springs, and their yield is abundant and good. In the third belt there are but few wells, and jharas are resorted to; the supply is deficient and so bad, that the unhealthiness of the Mandvi and Pardi talookas is, by the Natives, ascribed to it.

137. BROACH.—Upon the whole this Collectorate is well supplied.

138. KAIRA.—Here, too, the supply is abundant and good, chiefly from well-built masonry wells. For 557 villages the supply is obtained from rivers or running streams. In 27 villages there are jharas, and a few of the poorer and low castes draw from tanks.

139. PANCH MAHALS.—In this district the water-supply is chiefly derived from wells and jharas. The Mahi is the one river of importance, and it only touches a few villages in the Godra talooka. The rural population of the Dohad and Jhalode Mahals are mostly Bheels, and they depend more upon

streams and jharas. The towns in this division depend upon tanks which are cleaned annually. The yield of the wells in the Halal talooka is said to be unwholesome. The wells in this district vary in depth from 20 to 40 feet, and, as a rule, are well built. Their supply is abundant and good.

140. AHMADABAD.—There is no material difference between the sources of supply in this Collectorate, and that in the other districts of Guzerat, nor in the quality of the water.

141. For SIND generally, the supply is from canals and wells, indirectly from the Indus. From the river itself it is not so much taken, as the villages lie back somewhat; and, as a rule, it is found at no great depth. The quality is good, but the wells must be used constantly to keep them sweet. Caste distinctions being less rigidly observed in Sind, the village wells are open to all; but of course there are exceptions to this rule. Kurrachee is certainly the worst supplied town in the province, perhaps in the Presidency; and although various schemes have been brought forward at different times, the question is still unsettled.

142. Although many towns throughout the Presidency are supplied from artificial reservoirs, the city of Bombay is the only one with a regular water service like that of European towns. The supply from the Vehar Lake is, in theory, 17 gallons per head per diem for a population of 650,000; but, owing to defects in distribution, the real amount is only $7\frac{1}{2}$ gallons. Another reservoir is in course of construction at Tulsi, and from this the supply will be 6 gallons per head per diem. Each reservoir will have its own main, and will supply its own districts; thus, Vehar will give 22 gallons per head to a population of 500,253, and Tulsi will supply 26 gallons per head to 154,152.

143. As regards distribution, that is, the supply to individual units, it is everywhere faulty. In Bombay even, apart from the purely engineering questions of pressure, capacity, friction, &c., there are *created* sources of impurity in the shape of open public dipping wells. At all the flights of steps on fresh-water rivers, at the tanks, and at the larger wells, the contamination is something horrible. With all their boasted love of pure drinking water, the carelessness of the people is more than culpable; and such are their habits that, wherever they have access to a source of supply, they invariably foul it. There is but one principle to be followed, and this is to cut off all communication with the source, to close it hermetically, until it is delivered into the receiving vessels. With a pipe service this can easily be done without any inconvenience to the public. There are few towns or villages which could not supply the labour to work at least one lift and force pump; so, in this way, the well itself might be covered in, and the water delivered at any distance in the most suitable locality, whilst distinction of caste might be preserved by having different tanks.

144. As the irrigation works are indirect sources of supply, it is satisfactory to know they are being extended all throughout the Presidency, notably at Kurruckwasla near Poona, at Ekruk near Sholapur; in Satara and Ahmadnagar; in Nasik and Khandesh; in the Southern Mahratta Country, in Guzerat, and in Sind. In every Collectorate, too, the water-supply is everywhere sought to be improved by grants from local funds; and large sums are spent annually under the immediate care and supervision of the District Officers.

STATEMENT showing the different Sources of WATER SUPPLY *in the different Divisions of the* BOMBAY PRESIDENCY.

	1	2	3	4		5	6	7	8
	Districts.	Number of Inhabited Estates, i.e., Villages and Towns.	Total Population.	Villages which contain Wells in the Upper Castes and also Dhers.		Villages which contain Wells only frequented by Higher Castes.	Villages which drink water of Running Streams.	Villages which drink Tank water.	Villages which drink water from Jharas or Holes dug in dry beds of Nalas.
				Number.	Population.				
DECCAN	Khandesh ...	3,111	1,038,585	458	338,846	915	1,329	6	99
	Nasik ...	1,623	602,793	262	133,005	532	626	6	138
	Ahmadnagar ...	1,339	772,622	290	203,399	357	496	1	186
	Poona ...	1,202	764,682	411	201,657	104	687	32	63
	Satara ...	1,414	1,082,141	77	123,140	323	578	13	456
	Sholapur ...	648	588,291	89	180,612	296	261	5	35
	Belgaum ...	1,140	842,503	109	114,971	330	532	46	71
	Dharwar ...	1,315	939,629	111	158,171	303	240	532	132
	Kaladgi ...	1,148	740,590	73	138,810	61	512	76	400
KONKAN.	Kanara ...	1,666	383,360	238	123,971	876	213	178	161
	Ratnagiri ...	1,328	1,040,302	544	573,876	445	474	13	276
	Kolaba ...	959	359,593	191	100,600	375	147	64	474
	Thana ...	2,149	747,923	924	363,359	540	333	104	300
GUZERAT.	Surat ...	759	510,781	316	260,130	308	59	8	68
	Broach ...	406	318,102	88	78,293	291	2	13	22
	Kaira ...	589	782,733	314	537,138	364	157	117	27
	Panch Mahals	660	213,575	32	9,309	169	154	96	209
	Ahmadabad...	884	693,212	421	391,780	425	151	154	46
	Deccan	12,940	7,371,836	1,880	1,592,611	3,870	5,261	717	1,580
	Konkan	6,102	2,531,178	1,897	1,161,806	2,236	1,167	359	1,211
	Guzerat	3,298	2,518,403	1,171	1,276,650	1,557	523	388	372
	Total.....	22,340	12,421,417	4,948	4,031,067	7,663	6,951	1,464	3,163

STATEMENT showing the Sources of WATER SUPPLY *for the undermentioned Towns and Villages of the* BOMBAY PRESIDENCY.

1	2	3	4	5	6	7	8	9	10	11
District.	Taluka or Tahsil.	Number of Inhabited Estates, *i. e.*, Villages and Towns.	Total Population.	Villages which contain Wells for the Upper Castes and also Dhers.		Villages which contain Wells only frequented by Higher Castes.	Villages which drink water of Running Streams.	Villages which drink Tank water.	Villages which drink water from Jharas or holes dug in dry beds of Nalahs.	REMARKS.
				Number.	Population.					
KHANDESH.	Taluka Bhosawal	153	63,398	68	33,680	20	39	1	.....	25 villages deserted.
	Petta Edulabad	91	29,757	22	9,119	2	34	.....	.....	35 Do. The 2 villages in Column 6 are included and 34 in Column 7.
	Taluka Sowda	91	65,173	35	51,668	20	26	.....	1	9 villages deserted.
	Petta Ravere	71	24,352	24	15,982	14	13	.....	1	19 Do.
	„ Yawal	81	32,953	43	30,959	.....	11	.....	.....	27 Do.
	Taluka Chopda	111	51,581	53	29,516	9	32	1	1	15 Do.
	„ Jamner	198	70,351	56	24,910	23	90	.....	.....	49 villages uninhabited.
	„ Nasirabad	111	53,845	27	18,005	20	64	1	.....	
	„ Nandurbar	183	45,285	.....	761	.....	124	.....	.....	Out of this 24 villages drink water from the river Tapti.
	„ Taloda	252	35,278	1	5,145	75	174	1	1	Out of this 15 villages drink water from the river Tapti and 15 from the Narbada river.
	„ Shahada	208	46,228	.....	.....	128	80	.....	.....	Out of this 23 villages drink water from the Tapti, 32 from the Gomi, 12 from the Waki, 4 from the Umri, 8 from Lasri, and 1 from the Khapri rivers.
	„ Sirpur	178	30,818	4	4,405	37	37	.....	13	Only 91 villages are inhabited, out of which 27 drink water of the Tapti river.
	„ Virdel	140	63,568	Uncertain.	11,152	.....	53	.....	.....	27 villages drink water from the river Tapti, 6 from Panjra, and 20 from the Borai.
	„ Dhulia	189	66,929	63	36,272	43	57	1	8	44 villages deserted : Column 9 comprises villages which constantly derive their water from jharas.
	„ Pimpalner	104	31,889	9	3,013	28	67	.....	.....	
	Petta Nizampur	84	15,932	1	174	51	32	1	.....	16 villages deserted.
	Carried forward ...	2,245	727,337	406	274,761	470	933	6	25	

1	2	3	4	5	6	7	8	9	10	11
District.	Taluka or Tahsil.	Number of Inhabited Estates, i.e., Villages and Towns.	Total Population.	Villages which contain Wells for the Upper Castes and also Dhers.		Villages which contain Wells only frequented by Higher Castes.	Villages which drink water of Running Streams.	Villages which drink Tank water.	Villages which drink water from dharas or holes dug in dry beds of Nalahs.	Remarks.
				Number.	Population.					
	Brought over ..	2,245	7,27,337	406	2,74,761	470	933	6	25	
Khandesh—*concld.*	Taluka Amelnar	161	51,611	22	14,634	90	49	.....	.....	In Column 2 is shown only the No. of villages populated.
	Petta Parola	83	28,252	7	15,259	31	20	.....	25	21 villages deserted.
	Taluka Irandol	229	76,838	3	23,430	100	84	.....	.....	42 Do.
	,, Pachora...	192	79,412	11	6,072	125	166	.....	.....	
	Petta Bhudgam	77	30,567	9	4,690	50	36	.....	15	12 Do.
	Taluka Chalisgaon	124	44,568	.....	.....	49	41	.....	34	
	Total	3,111	10,38,585	458	3,38,846	915	1,329	6	99	
Nasik.	Nasik	136	58,269	54	13,945	.....	63	2	17	
	Sinner	99	65,320	11	14,578	12	74	.....	2	
	Igatpuri...	130	52,529	8	7,236	84	36	2	.....	
	Niphar	122	60,403	21	9,434	1	91	1	8	
	Dindori	128	63,105	83	42,070	.....	45	.....	.....	
	Chandur	101	36,891	5	5,913	27	69	.....	.....	
	Sawargaon	94	32,549	15	7,976	34	3	.....	42	
	Nangam	78	25,121	1	1,343	24	53	.....	.....	
	Maligam	142	61,806	20	10,111	63	46	1	12	
	Baglan	348	1,00,323	31	11,236	142	146	.....	20	
	Peint	245	46,477	13	9,163	195	.....	.....	37	
	Total.....	1,623	6,02,793	262	1,33,005	582	626	6	138	

Ahmadnagar.	Nagar	113	105,905	36	30,022	24	25	1	18		
	Parner	122	82,422	17	14,098	5	23	.....	30		
	Sharigonda	85	64,936	8	14,968	34	29	.....	14		
	Karjat	80	48,766	3	1,473	18	29	.....	30		
	Jamkher	76	72,994	9	11,237	38	15	.....	14		
	Sheogaon	179	83,384	119	63,068	.....	33	.....	27		
	Newasa	146	65,146	22	16,660	47	60	.....	17		
	Raohri	112	59,083	27	16,348	3	80	.....	2		
	Kopargaon	121	60,317	26	20,292	22	73	.....	.....		
	Sangamner	150	68,684	9	5,037	49	64	.....	28		
	Ankola	155	60,985	14	10,196	70	65	.....	6		
	Total.....	1,339	772,622	290	203,399	357	496	1	186		
Poona.	Khed	244	133,497	73	35,496	.....	179	2	1	From 1867-68 to 1871-72 Rs. 12,352-6-7 have been expended from Local Funds on wells, and Rs. 44,157-3-7 on tanks.	
	Juner	163	106,531	109	22,383	.....	91	.....	1		
	Sirur	76	65,381	32	32,099	.....	49	2	.....		
	Haveli	243	144,580	98	55,888	.....	156	7	7		
	Mawal	168	86,649	75	24,205	.....	86	16	6	The Municipalities have expended some of their funds also.	
	Indapur	86	60,553	6	15,540	31	40	.....	9	No fixed sums have been set apart annually for water-supply.	
	Bhimthadi	130	92,860	1	1,529	48	62	3	15		
	Purandhar	92	74,631	17	14,517	25	24	2	24		
	Total.....	1,202	764,682	411	201,657	104	687	32	63		
Satara.	Satara	148	106,024	4	25,591	42	*48	1	53	* Of these 38 villages also drink water from wells.	
	Jaoli	250	54,954	.....	.....	47	38	3	162		
	Wai	127	84,479	.....	.....	48	59	.....	20		
	Koregaum	74	74,848	.....	.....	41	31	2	.....		
	Walwa	136	156,089	10	33,666	19	†70	2	35	† Some of these villages are on the banks of Krishna and Krishna Canal, and consequently they drink water of that river and canal.	
	Karar	103	125,731	.....	.....	24	50	1	28		
	Carried forward...	838	602,125	14	59,257	221	296	9	298		

1	2	3	4	5	6	7	8	9	10	11
District.	Taluka or Tahsil.	Number of Inhabited Estates, *i.e.*, Villages and Towns.	Total Population.	Villages which contain Wells for the Upper Castes and also Dhers.		Villages which contain Wells only frequented by Higher Castes.	Villages which drink water of Running Streams.	Villages which drink Tank water.	Villages which drink water from Jharas or holes dug in dry beds of Nalahs.	Remarks.
				Number.	Population.					
	Brought over.....	838	602,125	14	59,257	221	296	9	298	
Satara—*concd.*	Patun	202	115,491	.....	.....	‡ 18	§ 90	2	92	‡These villages drink also water of streams and rivers.
	Khanapur	91	79,027	12	17,822	12	16	.....	51	§Drink water of the Quoina, Kera and Waug.
	Tasgaon	49	81,060	12	17,170	5	27	.....	5	
	Khatao	85	81,950	.....	.....	14	71	.....	.....	Some of the villages must have more than one source of drinking.
	Maun	77	65,811	34	22,943	32	33	2	9	
	Malsiras	69	55,048	3	4,671	20	45	.....	1	
	Malcolm Peit	3	1,629	2	1,277	1	.....	.....	.....	
	Total.....	1,414	1,082,141	77	123,140	323	578	13	456	
Sholapur.	Sholapur...	150	1,36,737	1	31,599	95	68	4	.....	No sums are specially set apart for the water-supply out of Local or Municipal Funds, but the requirements of the people from these sources are met annually as far as means will allow.
	Barsi	124	113,972	26	42,486	55	42	.....	1	
	Marah	89	17,964	20	33,928	46	19	.....	14	
	Karmala...	123	93,827	16	21,970	68	34	.....	5	
	Pandharpur	85	75,822	23	42,482	1	70	1	.....	
	Sangola	77	69,969	3	8,147	31	28	.....	15	
	Total.....	648	588,291	89	180,612	296	261	5	35	

Belgaum.	Belgaum	... ...	200	117,188	48	47,389	62	62	3	25	
	Sampgaon	... ...	121	121,678	8	6,629	55	46	2	10	
	Bidi ...	... ...	220	72,296	30	24,608	106	75	9	.....	
	Chikodi ...	... ...	*280	221,023	.....	.... .	73	195	8	2	* The number of villages 213.
	Parasgad	... ...	125	108,446	15	20,667	32	51	19	8	
	Gokak ...	... ...	113	99,491	1	1,451	32	53	3	24	
	Athni ...	... ...	81	102,381	7	14,227	20	56	2	2	
		Total.....	1,140	842,503	109	114,971	380	532	46	71	
Dharwar.	Dharwar	... ...	133	116,280	3	5,778	61	27	39	3	
	Hubli ...	... ...	80	100,310	21	49,406	16	4	33	6	Vide Collector's letter No. 3378, dated 12th November 1872, and its accompanying Statements.
	Nawalgund	... ...	93	102,219	.....	.....	4	14	50	25	
	Dambal ...	... ...	100	117,107	17	40,967	37	13	5	28	
	Bankapur	... ...	143	79,053	19	16,493	49	6	51	18	
	Ranibednur	... ...	126	83,882	4	8,710	31	52	32	7	
	Hangul ...	... ...	162	63,235	12	5,077	39	39	72	.....	
	Karajghi...	... ...	131	88,173	1	3,692	20	46	43	21	
	Kalghatghi	... ...	108	50,354	27	12,191	3	6	72	.....	
	Kod ...	... .	180	74,236	1	439	23	25	130	1	
	Roan ...	... ...	59	70,780	6	15,418	17	8	5	23	
		Total.....	1,315	939,629	111	158,171	300	240	532	132	
Kaladgi.	Indi ...	... ...	122	97,114	1	685	87	88	.....	65	
	Mudibchal	... ...	151	76,937	6	11,116	86	50	.....	95	
	Sindgi ...	... ...	145	99,269	36	33,400	74	88	.....	72	
	Bagewari	... ...	120	87,470	6	20,453	77	9	.....	40	
	Bijapur ...	... ...	92	78,163	2	14,411	50	56	6	19	
	Bagalkot	... ...	160	101,022	2	17,222	54	106	14	9	
	Badami ...	... ...	198	114,460	12	17,138	98	60	50	35	
	Hunagunda	... ...	160	86,155	8	24,385	87	55	6	65	
		Total.....	1,148	740,590	73	138,810	613	512	76	400	

District	2 Taluka or Tahsil.	3 Number of Inhabited Estates, &c., Villages and Towns.	4 Total Population.	5 Villages which contain Wells for the Upper Castes and also Dhers. Number.	6 Population.	7 Villages which contain Wells only frequented by Higher Castes.	8 Villages which drink water of Running Streams.	9 Villages which drink Tank water.	10 Villages which drink water from Jharas for holes dug in dry beds of Nalahs.	11 Remarks.
Kanara.	Karwar	61	44,710	6	11,718	45	8	.....	2	From 1867-68 to 1871-72 Rs. 12,352-6-7 have been expended from Local Funds on wells, and Rs 44,157-3-7 on tanks. The Municipalities have expended some of their funds also.
	Kumpta	151	89,960	.....	.....	131	17	.....	3	
	Sirsi	683	51,965	48	7,436	559	4	70	2	
	Honawar	130	83,225	79	65,500	32	18	1	.....	No fixed sums have been set apart annually for water-supply.
	Supa	400	48,914	12	5,124	56	142	52	138	
	Yellapur	146	29,186	9	2,084	44	23	54	16	
	Sidapur	95	35,400	84	32,109	9	1	1	.....	
	Total.....	1,666	383,360	238	123,971	876	213	178	161	
Ratnagiri.	Malwan	79	124,338	69	124,029	3	52	1	8	There are no Municipalities in this district. From Local Funds the requirements of the population are met annually as far as means will allow.
	Deogarh...	118	118,901	110	115,586	8	.....	.....	.....	
	Rajapur	220	166,347	110	102,197	76	106	3	26	
	Ratnagiri	146	116,852	37	42,716	86	60	1	101	
	Sangameshwar	155	98,831	.....	.....	133	128	4	22	
	Chiplun	254	186,179	57	60,462	77	51	2	65	
	Gohagarh	106	82,119	4	7,391	61	41	.....	.....	
	Dapoli	250½	146,735	157	121,495	1	36	2	54½	
	Total	1,328½	1,040,302	544	573,876	445	474	13	276½	

Kolaba.	Alibag	160	68,323	40	36,467	96	6	15	14
	Pen	127	44,534	4	8,773	70	26	33	49
	Petta Nagotna	71	19,771	27	10,071	44	2	2	1
	Roha	130	42,044	117	36,232	40	9	3	6
	Mangaon	224	77,389	1	1,815	79	37	9	920
	Mahar	247	107,532	2	7,233	46	67	2	195
	Total.....	959	359,593	191	100,600	375	147	64	474
Thana.	Dhana	213	85,935	55	11,729	26	58	3	71
	Mahim	188	70,232	36	31,162	101	34	5	12
	Bassein	92	35,880	22	25,291	33	4	19	14
	Salsette	113	74,215	.....	.....	102	2	9	.....
	Kalian	226	61,340	126	46,058	43	37	11	9
	Bhewndy	201	64,917	192	64,584	.....	2	.....	.....
	Wara	165	25,907	.....	.....	58	27	7	73
	Shahapur	271	85,051	176	65,614	37	28	.....	30
	Nurhad	173	51,951	130	43,005	17	25	.....	1
	Karjat	287	75,720	111	36,940	48	72	7	32
	Panwel	220	96,775	76	38,976	75	44	43	58
	Total.....	2,149	747,923	924	363,359	540	333	104	300
Surat.	Ulphar	116	61,863	32	25,063	82	.....	2	.....
	Choraci	64	39,536	54	33,294	10	.. ...	.....	.....
	Mandvi	123	43,549	67	32,486	.....	22	2	32
	Bardoli	124	100,143	32	23,269	46	18	1	27
	Jalalpur	91	72,694	42	47,747	46	1	2	.....
	Chikli	63	59,281	19	27,106	43	.....	.....	1
	Balsar	97	83,308	67	67,944	18	9	1	2
	Pardi	81	50,407	3	3,221	63	9	.....	6
	Total.....	759	510,781	316	260,130	308	59	8	68

1	2	3	4	5	6	7	8	9	10	11
District.	Taluka or Tahsil.	Number of Inhabited Estates, etc., Villages and Towns.	Total Population.	Villages which contain Wells for the Upper Castes and also Dhers.		Villages which contain Wells only frequented by Higher Castes.	Villages which drink water of Running Streams.	Villages which drink Taub water.	Villages which drink water from Jharas or holes dug in dry beds of Nalahs.	Remarks.
				Number.	Population.					
Broach	Broach Taluka ...	107	68,259	.....	.....	107	.....	.....	.....	
	Do. City ...	.....	36,699	.....	.....	.....	.....	.....	.....	
	Wagra ...	69	30,204	22	10,965	38	.....	.....	9	
	Ahmod ...	49	35,320	42	31,144	5	2	.....	.....	
	Jambusar ...	82	79,877	10	31,724	62	.....	10	10	
	Anklesar... ...	52	41,087	.....	.....	48	.....	1	3	
	Hansot ...	47	26,656	14	4,460	31	.....	2	.....	
	Total.....	406	318,102	88	78,293	291	2	13	22	
Kaira.	Anand ...	74	149,952	68	142,262	68	10	36	.....	
	Nariad ...	99	151,483	33	89,637	45	31	29	.....	
	Mahmudabad ...	60	85,754	13	22,149	27	29	.....	.....	
	Kapadvanj ...	86	86,742	5	26,052	55	39	9	6	
	Thasra ...	98	85,601	72	72,043	70	16	7	4	
	Borsad ...	90	144,528	56	120,600	32	4	.....	.....	
	Matar ...	82	78,673	67	64,395	67	28	36	17	
	Total.....	589	782,733	314	537,138	364	157	117	27	
Panch Mahals.	Godra ...	217	65,366	.....	.....	62	6	35	114	
	Kalol ...	65	37,333	.....	.....	4	11	1	19	
	Halol ...	140	24,247	25	6,779	44	15	11	54	
	Dohad ...	130	51,628	5	1,214	27	38	38	22	
	Jhalode ...	99	35,001	2	1,316	2	84	11	.....	
	Total.....	660	213,375	32	9,309	169	154	96	209	

| | | |

145. An attempt has now been made to put together such information as relates to the physical and descriptive geography of the Presidency; and, although the results are very far from satisfactory, they may perhaps serve as starting points for further observations. It is seen that the Presidency is on the western side of a gigantic promontory, which juts out into the Indian Ocean from the foot of the Himalya. There is a maritime strip breaking northwards into a great plain, and higher by some 1,800 feet is a vast high-lying plateau tilted eastward, and draining into the Bay of Bengal; on the western flank of this plateau is the mountain chain which receives the monsoon rainfall, and it is in this area that the many rivers have their rise. Their westward course is a short one, ending on the coast line in shallow sluggish lagoons, whilst to the eastward they fall eventually into the Godavery or the Krishna. The fact of their running at right angles to the chain in which they rise precludes the possibility of their having any important feeders, and reduces most of them to the rank of minor streams. In contrast to these Deccan rivers the Nerbudda and the Tapti run from east to west, and the valley of the former connects the lowland of Western India with the plain of Bengal. For all Sind there is the Indus with its net work of canals. As regards climate, the meteorological elements of temperature and rainfall are given for sufficiently detached points to take in the whole Presidency, and the geographical divisions are contrasted one against the other. The distribution of rainfall is shown on the summit of the Ghauts, and in lines running east and west, and the Bombay tables are given as the standard for the Konkan. All these details are shown by diagrams. There are shown also the forest areas in each Collectorate, and the sources of water-supply have also been noted. The Collectorate maps have been prepared at the Government Photozincographic Office in Poona; but unfortunately the series is as yet incomplete.

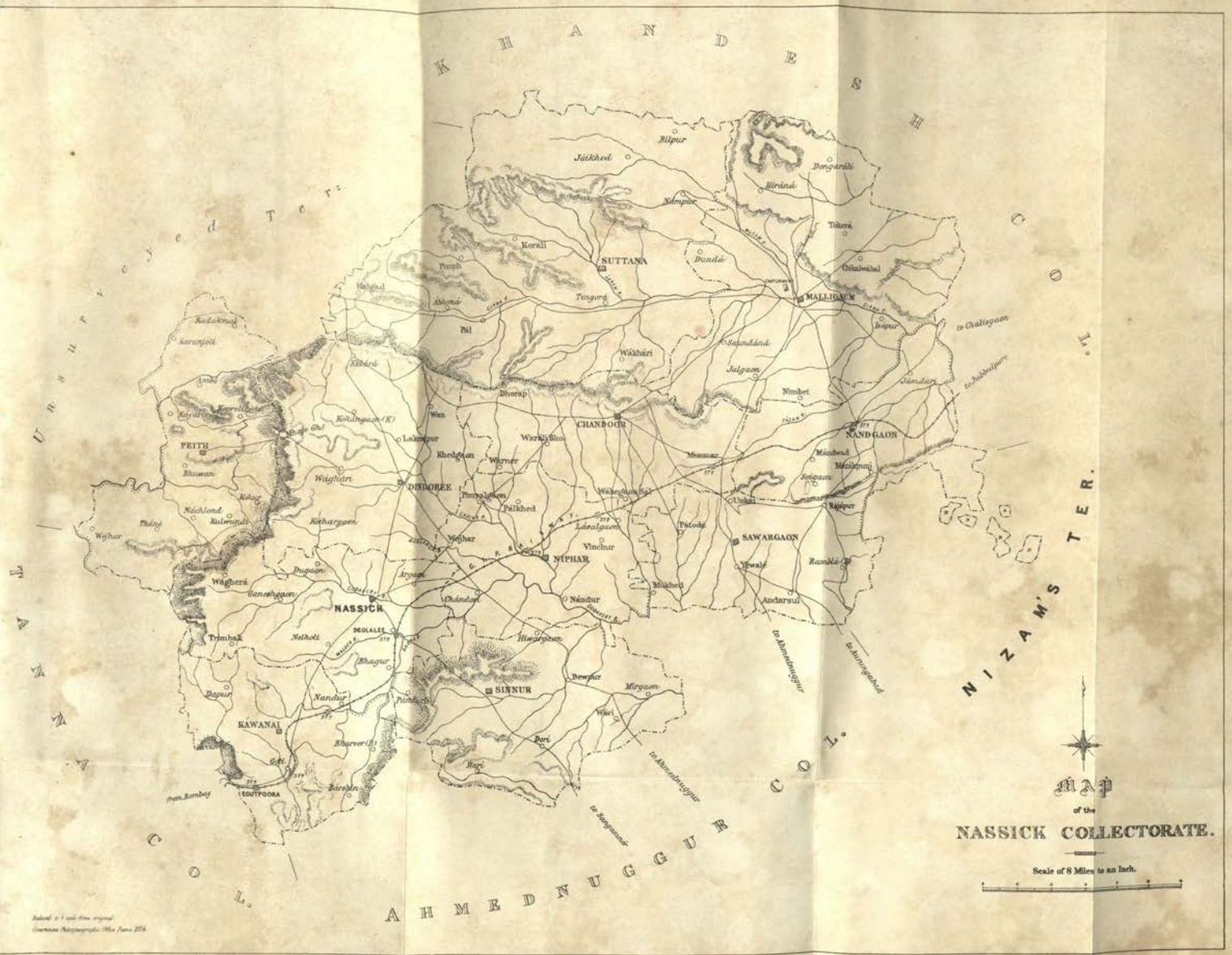
JOHN LUMSDAINE,
Sanitary Commissioner.

Sanitary Commissioner's Office,
Bombay, 14th April 1874.

PRINTED AT THE GOVERNMENT CENTRAL PRESS, BOMBAY.

BURWANEE STATE
HOLKAR'S TE
NASSICK COLLECTORATE
DHOOLIA
CHOPRA
CHALLESGAUM
MAP
of the
KHANDESH COLLECTORATE.
Scale of 8 Miles to an Inch.

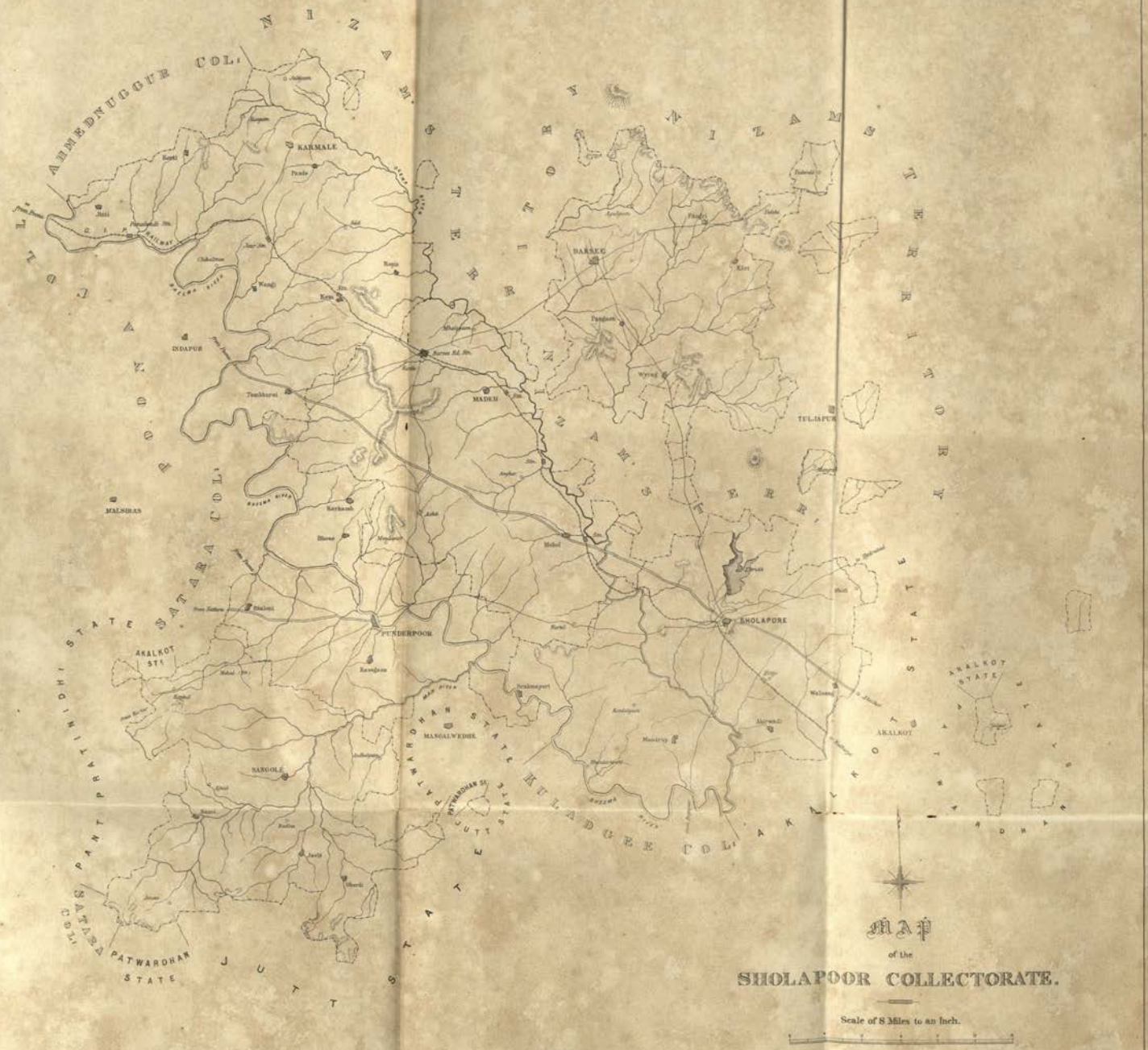
HOLKAR'S TERRITORY
PROVINCE OF NIMAR
PROVINCE OF BERAR
NIZAM'S TERRITORY
CHOPRA
JAMNER
WARANGAON
PACHORA
CHALISGAON


KHANDESH
COL.
NIZAM'S TER.
COL.
AHMEDNUGGUR
COL.
Unsurveyed Ter:
SUTTANA
MALLIGAUM
CHANDOOR
NANDGAON
DINDOREE
NIPHAR
SAWARGAON
NASSICK
SINNUR
KAWANAI
TEOUTPOORA
Bilpur
Játhkhed
Dongarlli
Kúmpur
Korali
Dundá
Tengarí
Pimpli
Pál
Wakhári
Jalgaon
Nimbet
Jámdarí
Dhorap
Wan
Lakhmapur
Khedgaon
Warkhi Bhoi
Mhasnar
Mándvad
Mánikpuj
Selgaon
Rájpur
Palkhed
Pimpalgaon
Wakadgaon Sai
Lásalgaon
Vinchur
Pátoda
Mohdhi
Andarsul
Mewalé
Rambá
Wajherí
Ganeshgaon
Dugaon
Chándor
Nándur
Hingrajgaon
Bewpur
Mirgaon
Pimpalgaon
Wiri
Pari
Nari
Nandur
Dapur
Bhagur
Netholi
Trimbak
DEOLALEE
Kohor
Kuhwandi
Kothargaon
Waghari
Pimpri
Thang
Weiher
Ambé
Karafgaon
Kadakmal
Saranjoti
Kokangaon (K)
Lohonj
Ghé
PEITH
Bhaman
Nachlond
Bhagwar (I)
Gati
Kirloh
from Bombay
to Chaligaon
to Ahmednuggur
to Aurungabad
to Sangamnár
Map
of the
NASSICK COLLECTORATE.
Scale of 8 Miles to an Inch.

POONA COLLECTORATE
NASSICK COLLECTORATE
NIZAM'S TERRITORY
AHMEDNUGGUR
PARNER
RAHOOREE
SUNGMNER
AKOLEH
NEWASEH
SEVGAON
JAMKHED
KURJUT
SHREEGOONDEH
SHOLAPOOR COLLECTORATE
MAP
of the
AHMEDNUGGUR COLLECTORATE.
Scale of 8 Miles to an Inch.

MAP
of the
POONA COLLECTORATE.
Scale of 8 Miles to an Inch.
AHMEDNUGGUR COLLECTORATE
PUNT SUCHEW
KOLABA
SHOLAPOOR COLLECTORATE
TARA COLLECTORATE
JUNAR
KHED
SIRUR
KADKALA
POONA
SASWAR
PATUS
INDAPUR
Shirwal
Baramati
Nimbgaon
Bhawanee
Chimchwad
Mandvgan
Walwa
Nimbut
Lohisurna
Shelgaon
Palasdew
Kalas
Rhedwadee

PUNT SUCHEW
PONAA COL.
RITTNAGHERRY COL.
PUNT PRITINIDHI
SHOLAPOOR
JUTT JAGHEER
SHOLAPOOR COL.
BELGAUM COL.
KOLAPOOR
PORTER.
WAER
MEDHEH
SATARA
PATUN
KOREGAUM
PHULTUN
MALSEERUS
MHUSWAD
WADUJ
KUDEGAUM
SURAH
TASGAUM
WALWEH
SANGLEE
MERUJ
Dahigaon
Velapur
Nowara
Akloj
Dhulgaon
Ashti
Bhiwadi
Khatav
Dahiwadi
Nimsod
Mayani
Kolhapur
Khanapur
Vita
Jath
Sawalaj
Kundal
Patan
Helwak
Mahur
Shirala
Kasegaon
Walwa
Islampur
Tasgaon
Palus
Miraj
Kurundwad
Jamkhandi
Mudhol
Ramdurg
Nargund
Gadag
Belgaum
Hubli
Dharwar
Kittur
Sangli
Miraj
Kolhapur
Panhala
Vishalgad
Ratnagiri
Malwan
Vingorla
Goa
Karwar
Sawantwadi
Ajra
Gargoti
Chandgad
Radhanagri
Kagal
Shahuwadi
Karad
Patan
Tasgaon
Khanapur
Atpadi
Jath
Sangli
Miraj
Kolhapur
Gadag
Belgaum
Hubli
Dharwar
Kittur
Karwar
Goa
Vingorla
Malwan
Ratnagiri
Panhala
Vishalgad
Kundal
Patan
Helwak
Mahur
Shirala
Kasegaon
Walwa
Islampur
Tasgaon
Palus
Miraj
Kurundwad
Jamkhandi
Mudhol
Ramdurg
Nargund
Gadag
Belgaum
Hubli
Dharwar
Kittur
Karwar
Goa
Vingorla
Malwan
Ratnagiri
Panhala
Vishalgad
MAP
of the
SATARA COLLECTORATE.
Scale of 8 Miles to an Inch.
Reduced to a scale from original
Government Photozincographic Office Poona 1874



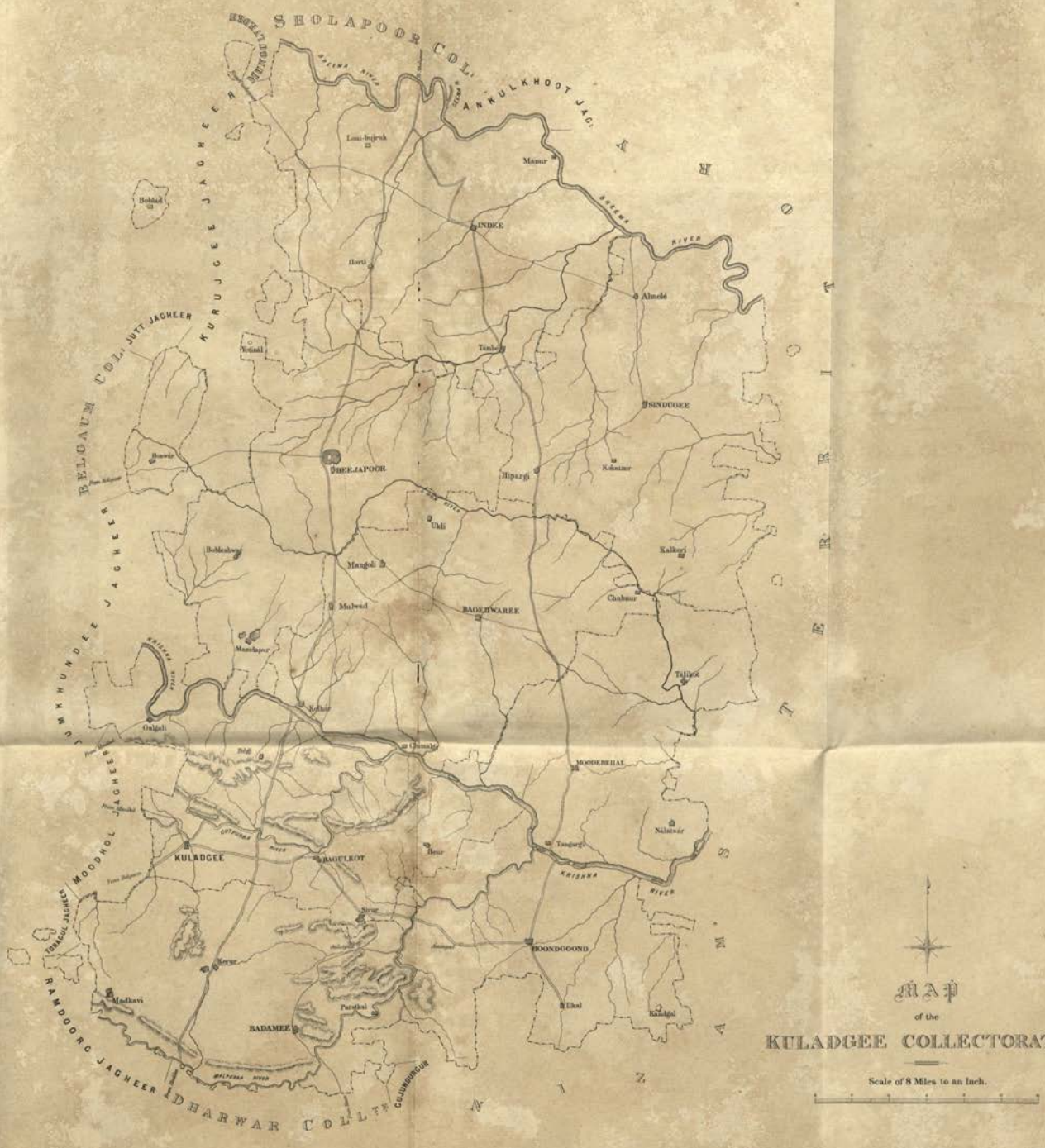
Reduced to 4 scale from original.
Government Photozincographic Office, Poona 1874.

MAP
of the
BELGAUM COLLECTORATE.

Scale of 8 Miles to an Inch.

Reduced to 4 scale from original Government Trigonometrical Survey 1855.

KULADGEE COLLTS.
BELGAUM COLLECTORATE
SOUTHERN MAHRATTA COUNTRY
BADAMEE
RAMDOORG JAGEER
ROAN
SOWLGOOND
DHARWAR
HOOBLEE
KOONDGOL
KULGHUTGEE
DUMBUL
SEERSUTTEE
LUMMERWUR
BANKAPOOR
KURDGEE
HANGUL
RANKEBENGOOR
ROD
MAP
of the
DHARWAR COLLECTORATE.
Scale of 8 Miles to an Inch.

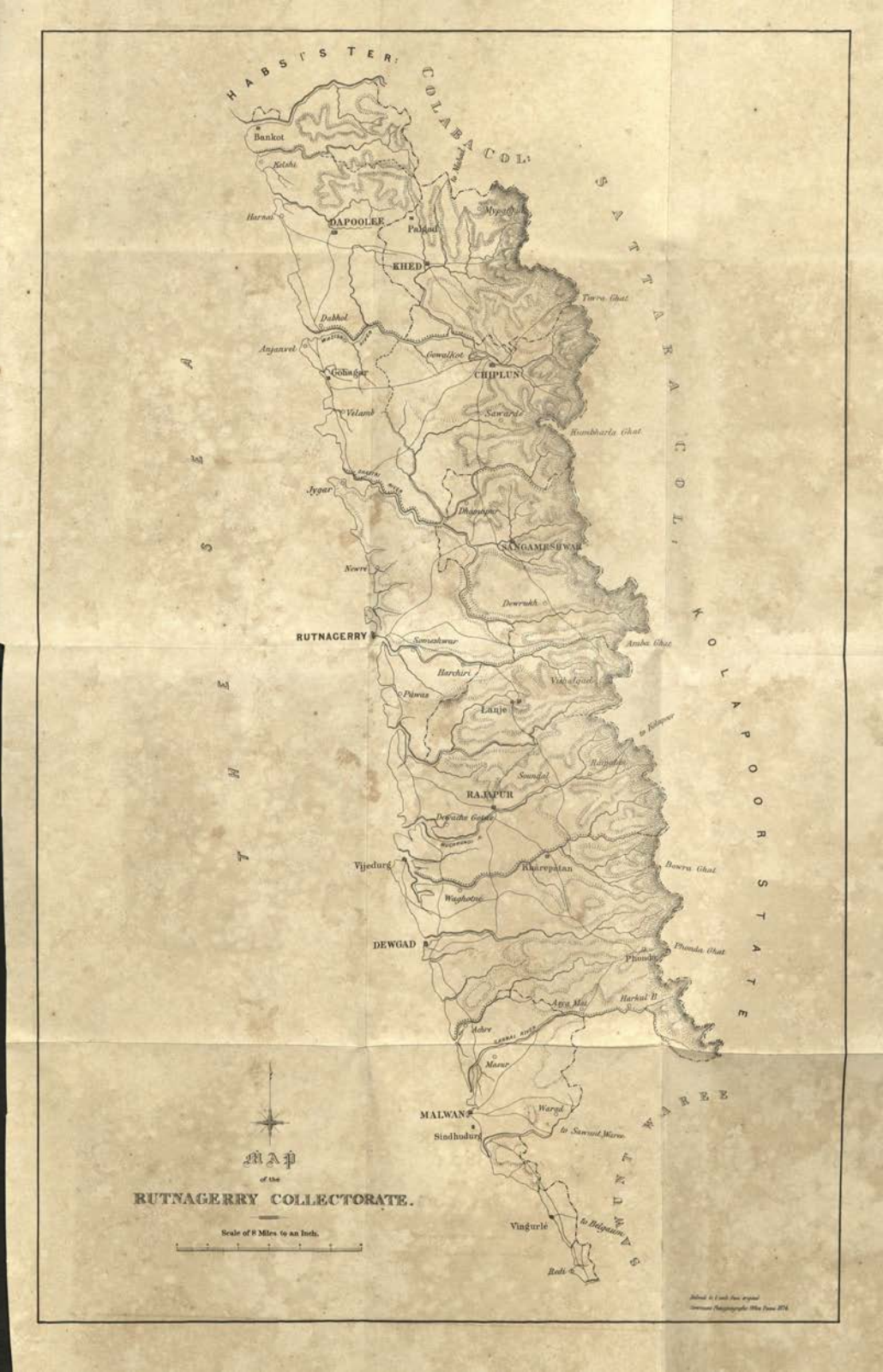


MAP
of the
KULADGEE COLLECTORATE.

Scale of 8 Miles to an Inch.

Reduced to 4 scale from original
Government Photozincographic Office, Poona 1870

BELGAUM COL.
PORTUGUESE TER.
DHARWAR COL.
MYSORE
SEA
Tiné Ghat
Piggi Ghat
Pálté
Dmli
Klmoli
SOOPA
Bámanvádi
HULLIYAL
Murkawad
Dándeli
Sámbrani
to Dharwar
to Bankapoor
Sánjoté
Prunoli
Kdgeti
from Goa
Hagwati
KULGHUTGEE
Kirwati
Lalgali
Hamoli
Wighri
Indur
YELLAPOOR
Kalsur
Mynhuli
Mundagod
Gugshiti
Hathali
Kaiga
KARWAR
Bali
Sidur
Amadalli
Bhartanhali
Pala
Malgi
Soenda
Bandli
Hulkal
Badangoli
Islur
ANKOLA
Gumur
SIRSEE
Sugaum
Gokarn
Karur
Kanasai
Herur
Mutali
KOOMTA
Chandawar
BILGY
Sidapur
Honalakani
HONAUWAR
Hiker
Masanali
Gairsopa
Murki Durg
Dabol
Muchelwar Durg
Sirali
Hanalawali
Bádgal
to Sirpur
MADRAS PRESS
Scale of 8 Miles to an Inch.
Reduced to 1 mile from original.
Government Photozincographic Office, Poona 1874.
MAP
of the
CANARA COLLECTORATE.


HABSHI STATE
COLABA COLL.
SATTARA COLL.
KOLAPOOR STATE
PORTUGUESE TERRITORY
Bankot
Kelshi
Harnai
DAPOOLEE
Palgad
KHED
Mygaon
Tivra Ghat
Dabhol
Anjanvel
Gowalkot
Gohagar
CHIPLUN
Velamb
Sawarde
Rambharla Ghat
Jygar
Dhamapur
SANGAMESHWAR
Newre
Dewrukh
RUTNAGERRY
Someshwar
Amba Ghat
Harchiri
Vishalgad
Pawas
Lanje
Rajapoor
Soundal
RAJAPUR
Dewgadh Gotde
Vijedurg
Rharepatan
Dewra Ghat
Waghotne
DEWGAD
Phonda
Phonda Ghat
Arra Mal
Harkul B
Malvi
Masur
Warad
MALWAN
Sindhudurg
to Sawant Warre
Vingurlé
to Belgaum
Redi
MAP
of the
RUTNAGERRY COLLECTORATE.
Scale of 8 Miles to an Inch.

MAP

of the

COLABA COLLECTORATE.

Scale of 8 Miles to an Inch.

Reduced to ½ scale from original
Government Photozincographic Office Poona 1874.

MAP
of the
TANNA COLLECTORATE.

Scale of 8 Miles to an Inch.

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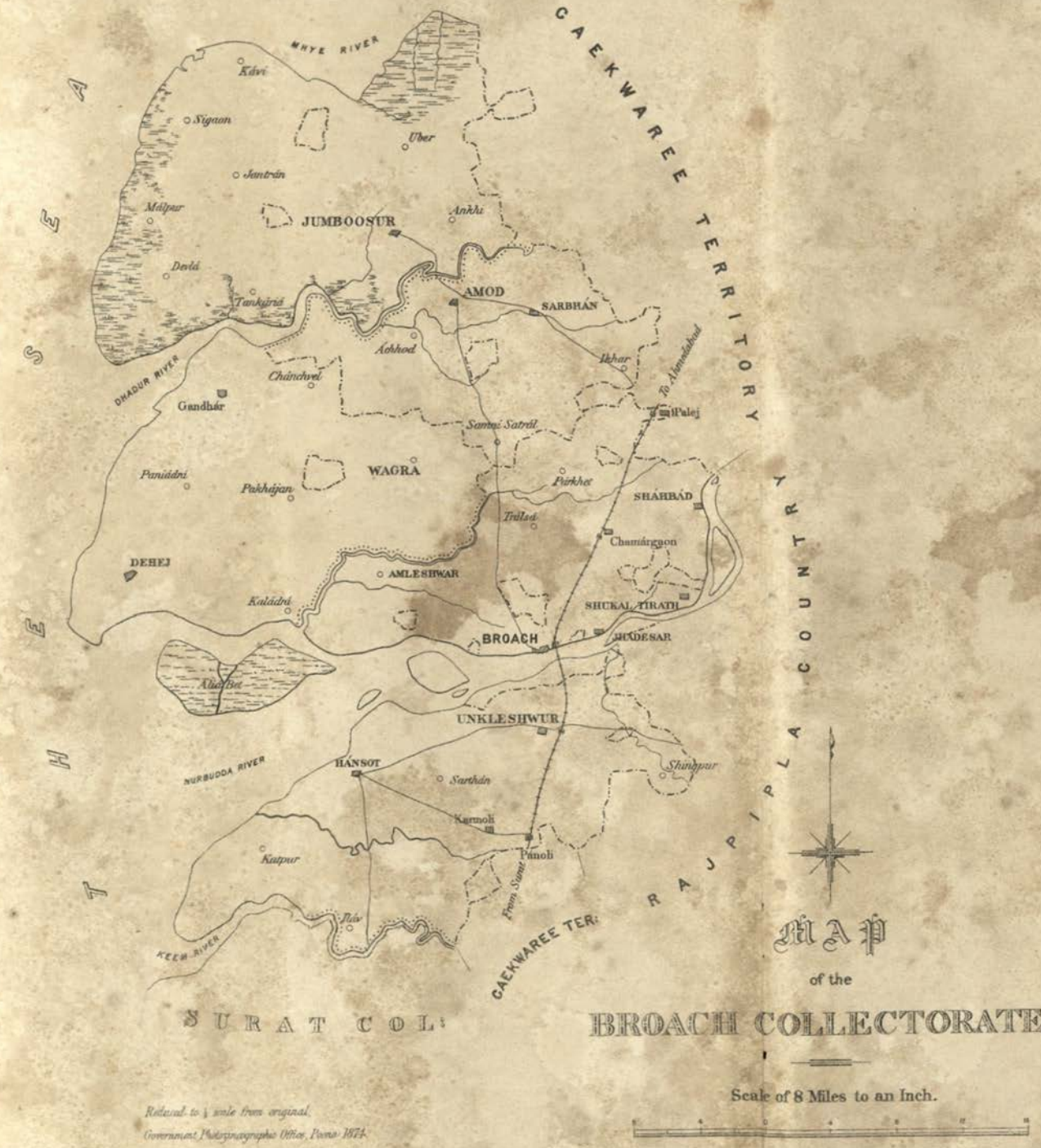
Reduced to ¼ scale from original
Government Photozincographic Office Poona 1874.



MAP

of the

BROACH COLLECTORATE.

Scale of 8 Miles to an Inch.

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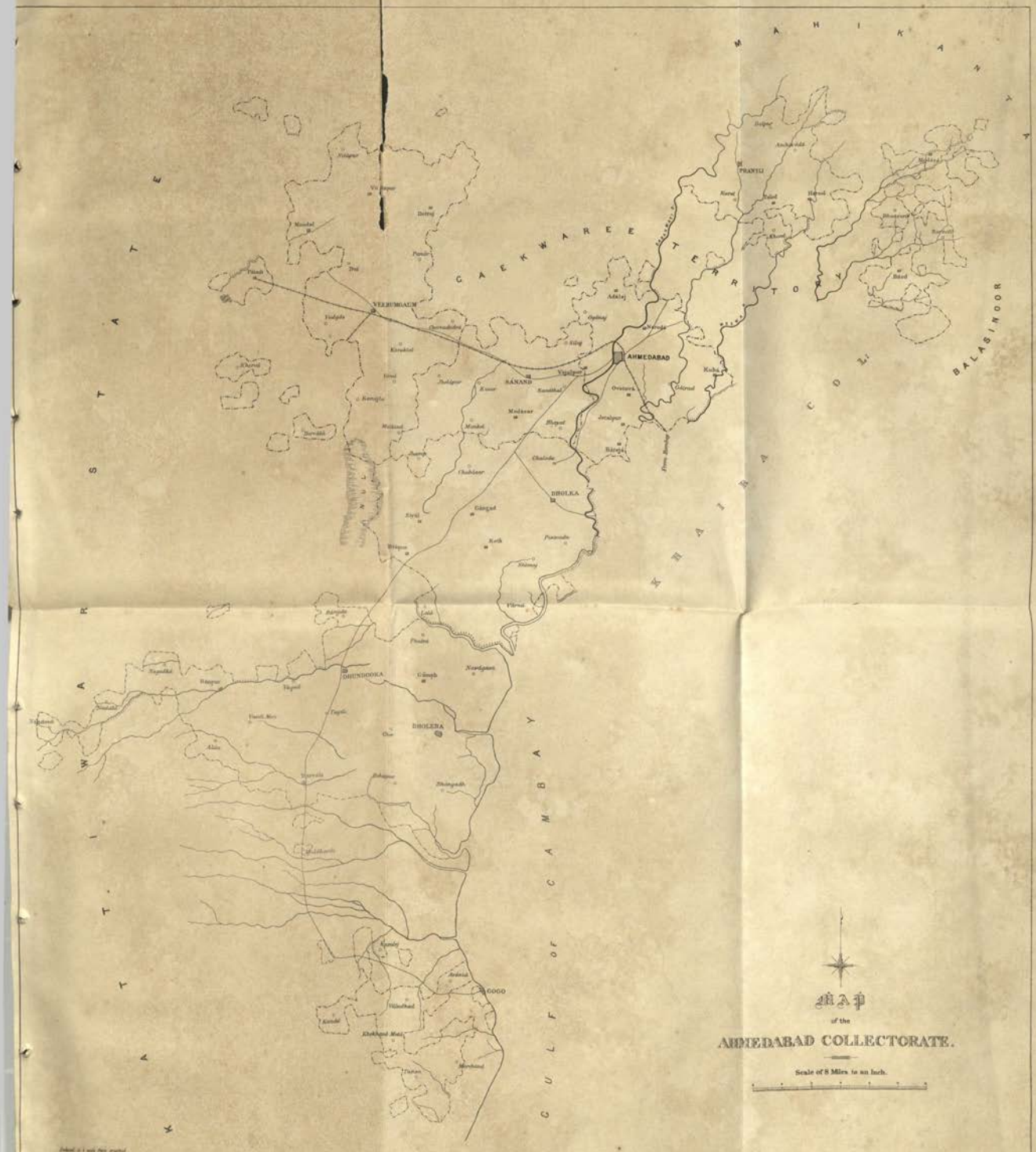
Reduced to ½ scale from original.

Government Photozincographic Office, Poona 1874.



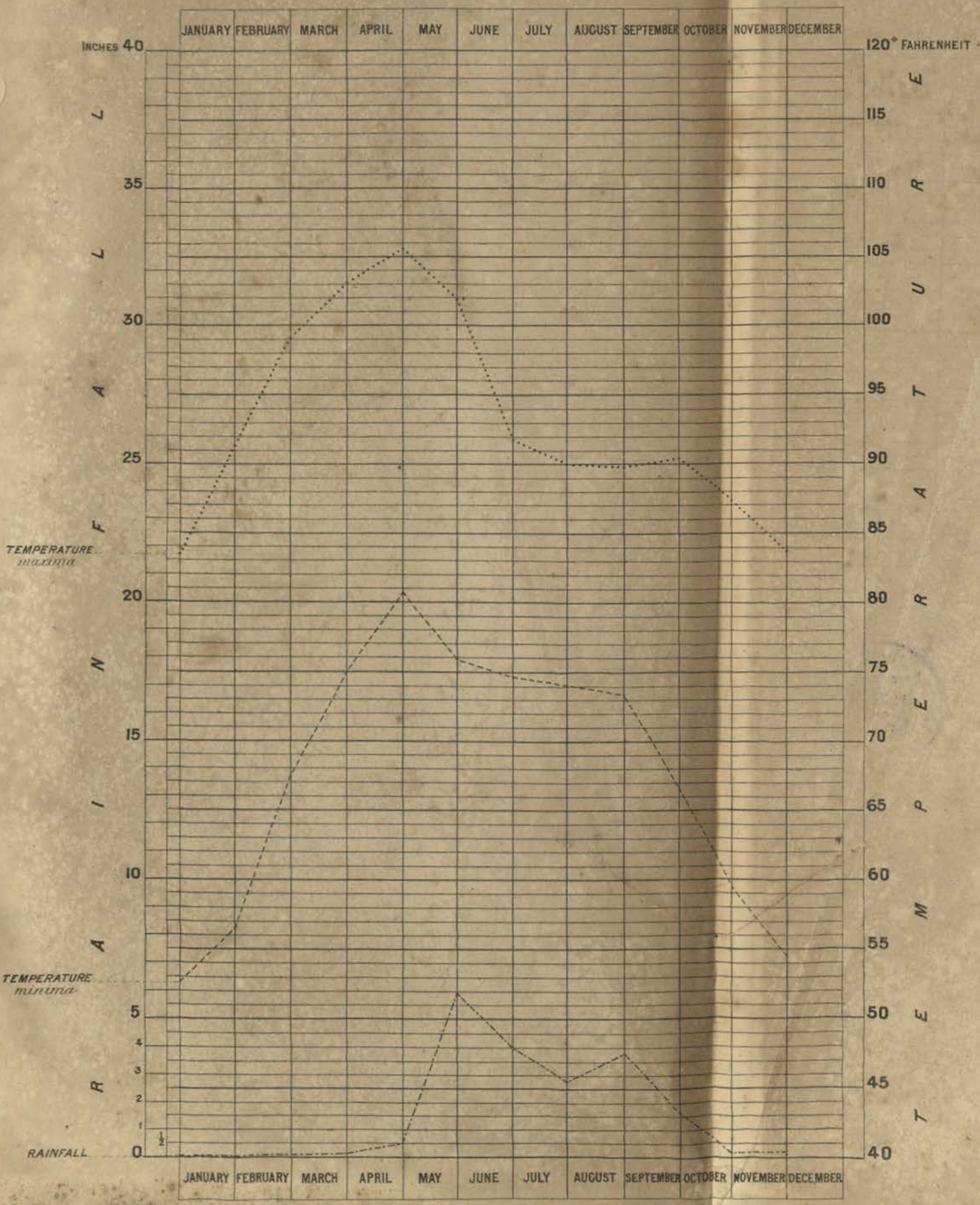
MAP

of the

AHMEDABAD COLLECTORATE.

Scale of 8 Miles to an Inch.

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT DHOOLIA, KHANDESH FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1870

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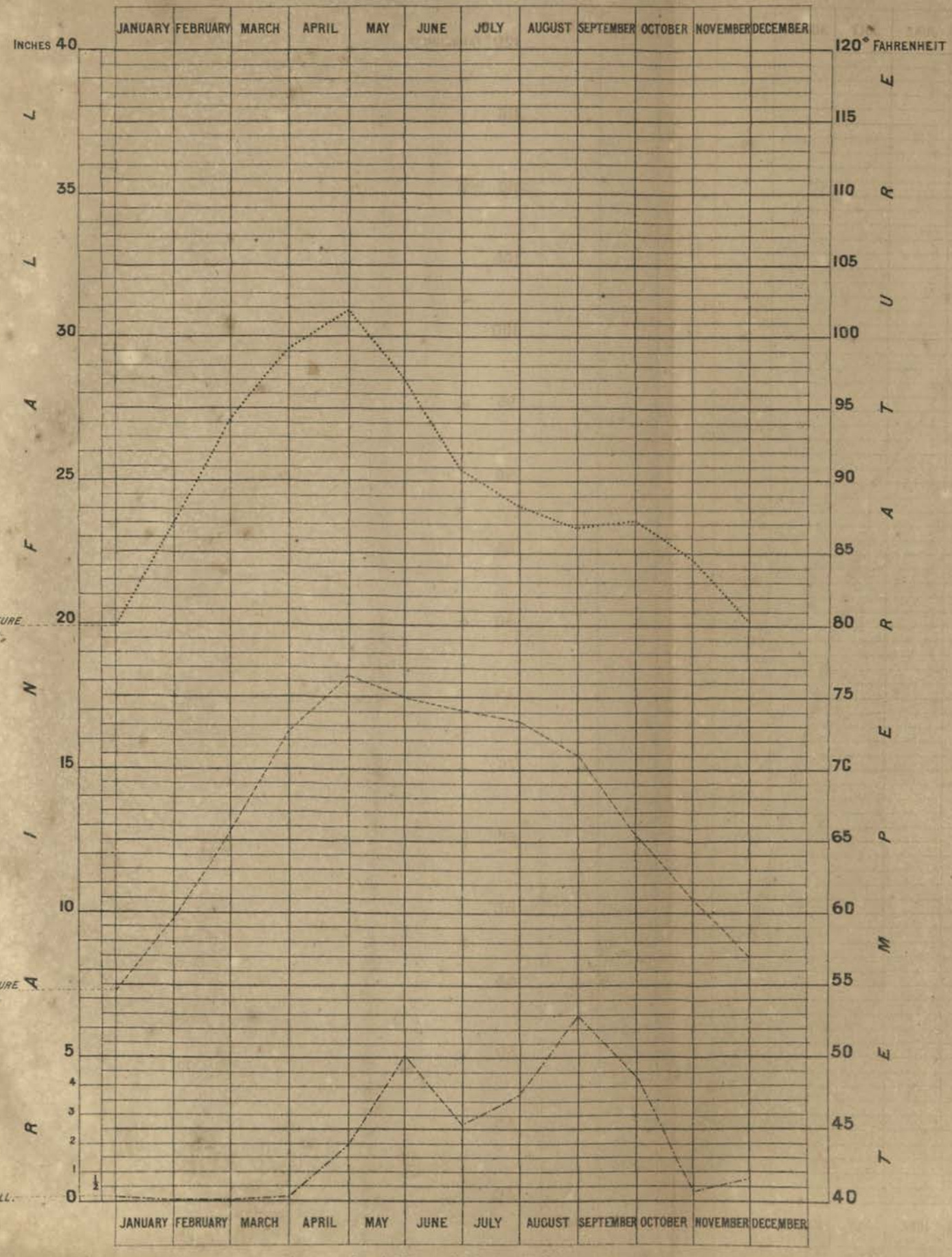
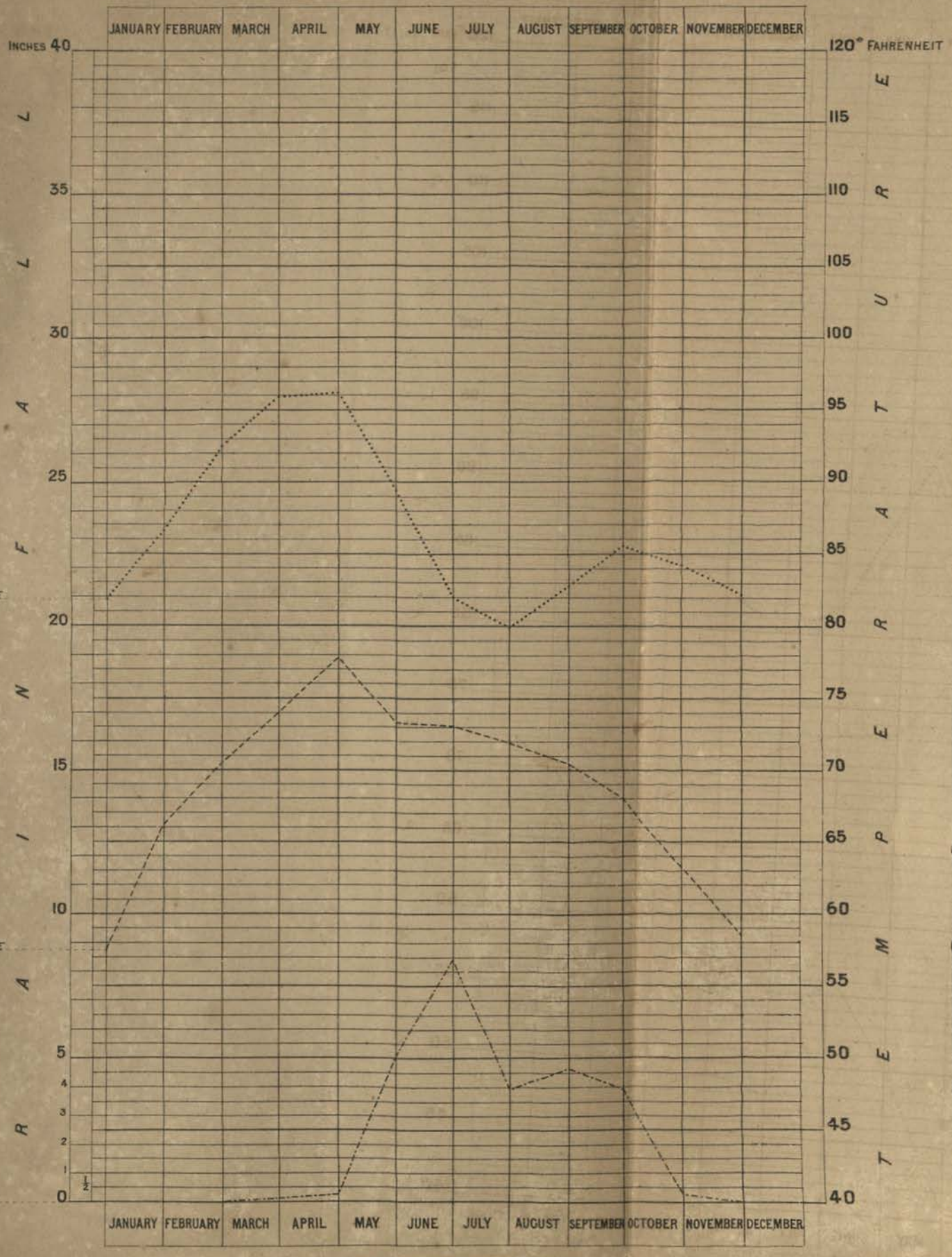
DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT AHMEDNCCUR FROM 1852 TO 1861 INCLUSIVE.



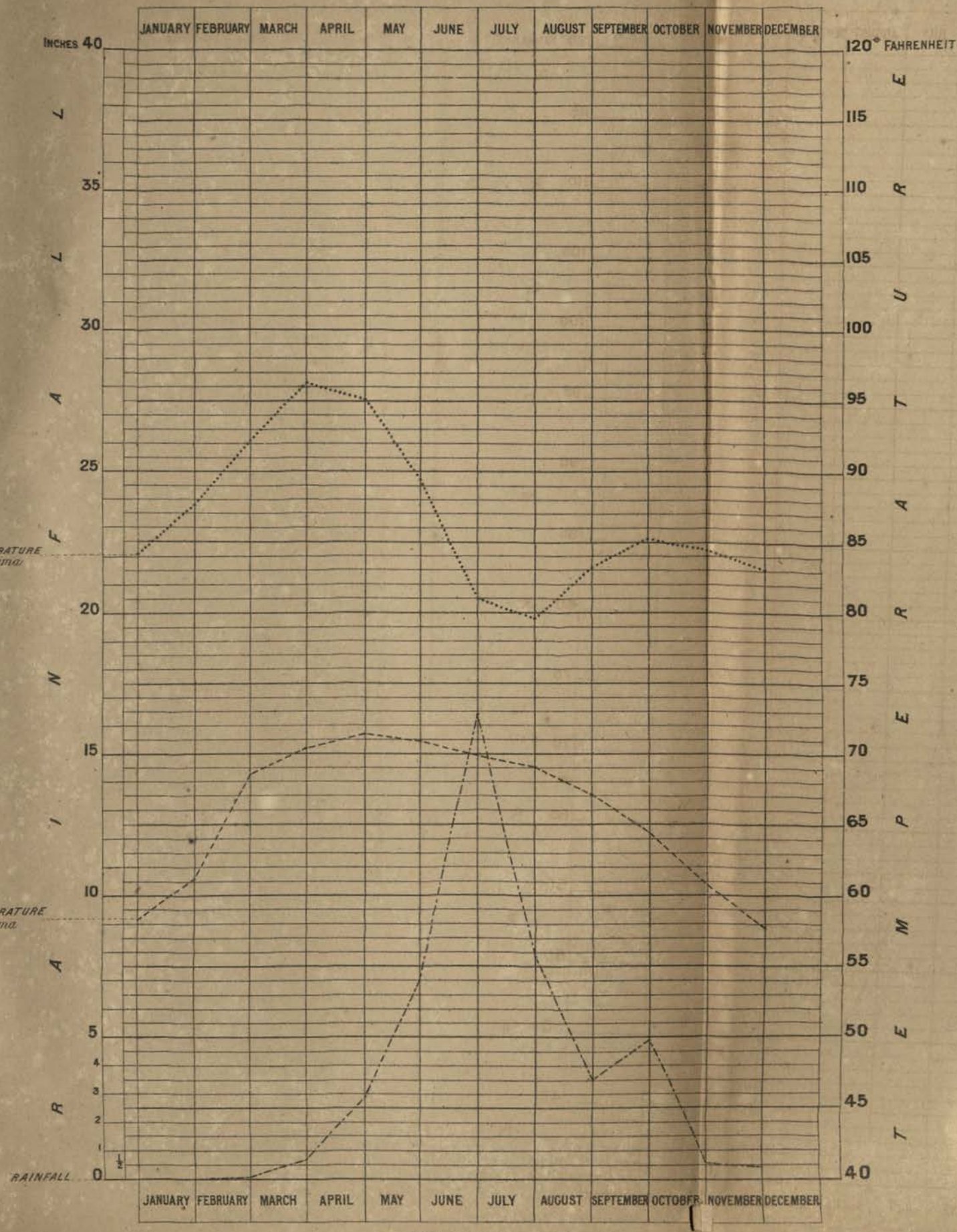
Prepared & Photozincographed Government Office Poona 1853

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT POONA FROM 1852 TO 1861 INCLUSIVE.



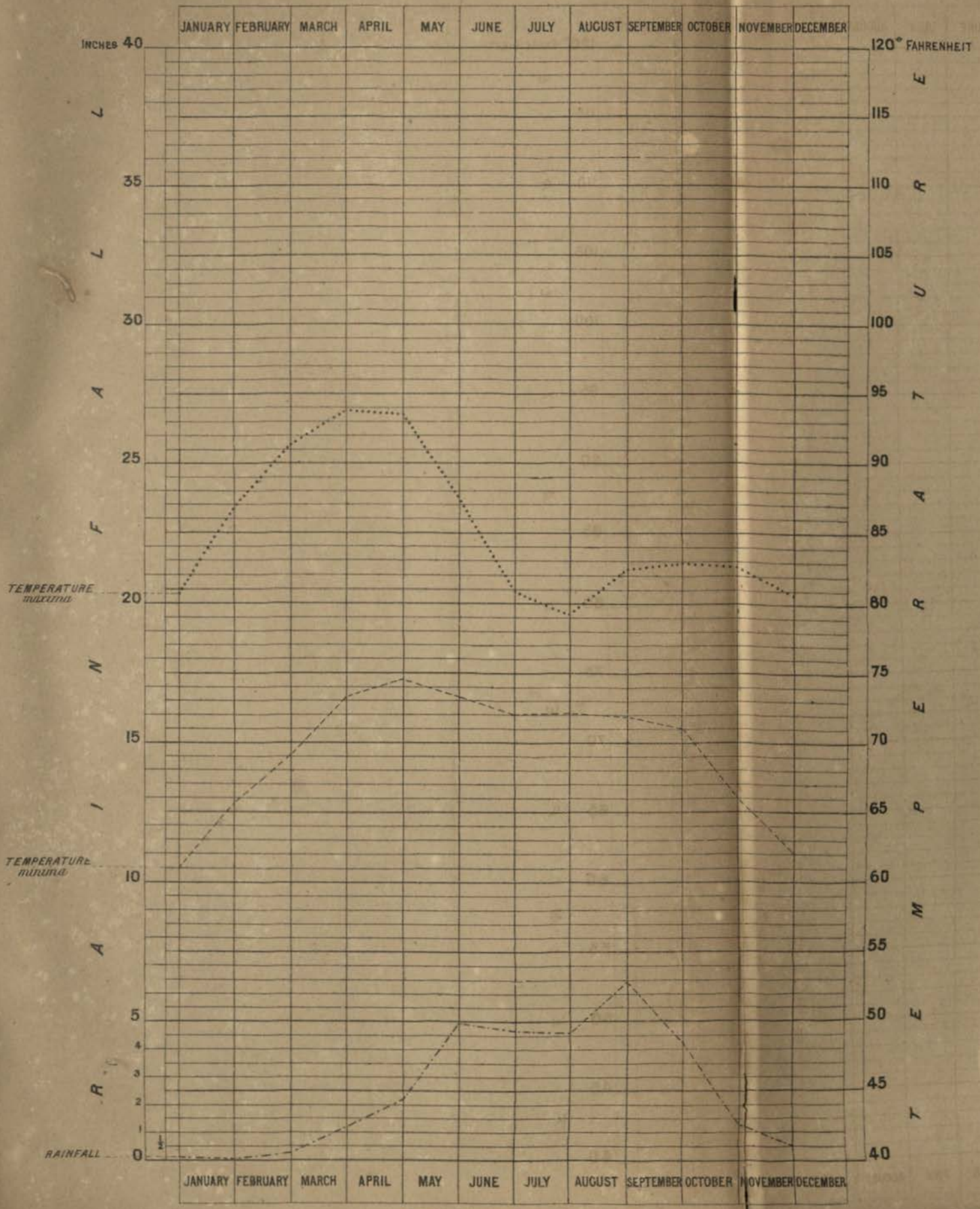
Prepared & Photolithographed Government Office Poona 1863

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT SATTARA FROM 1852 TO 1861 INCLUSIVE.



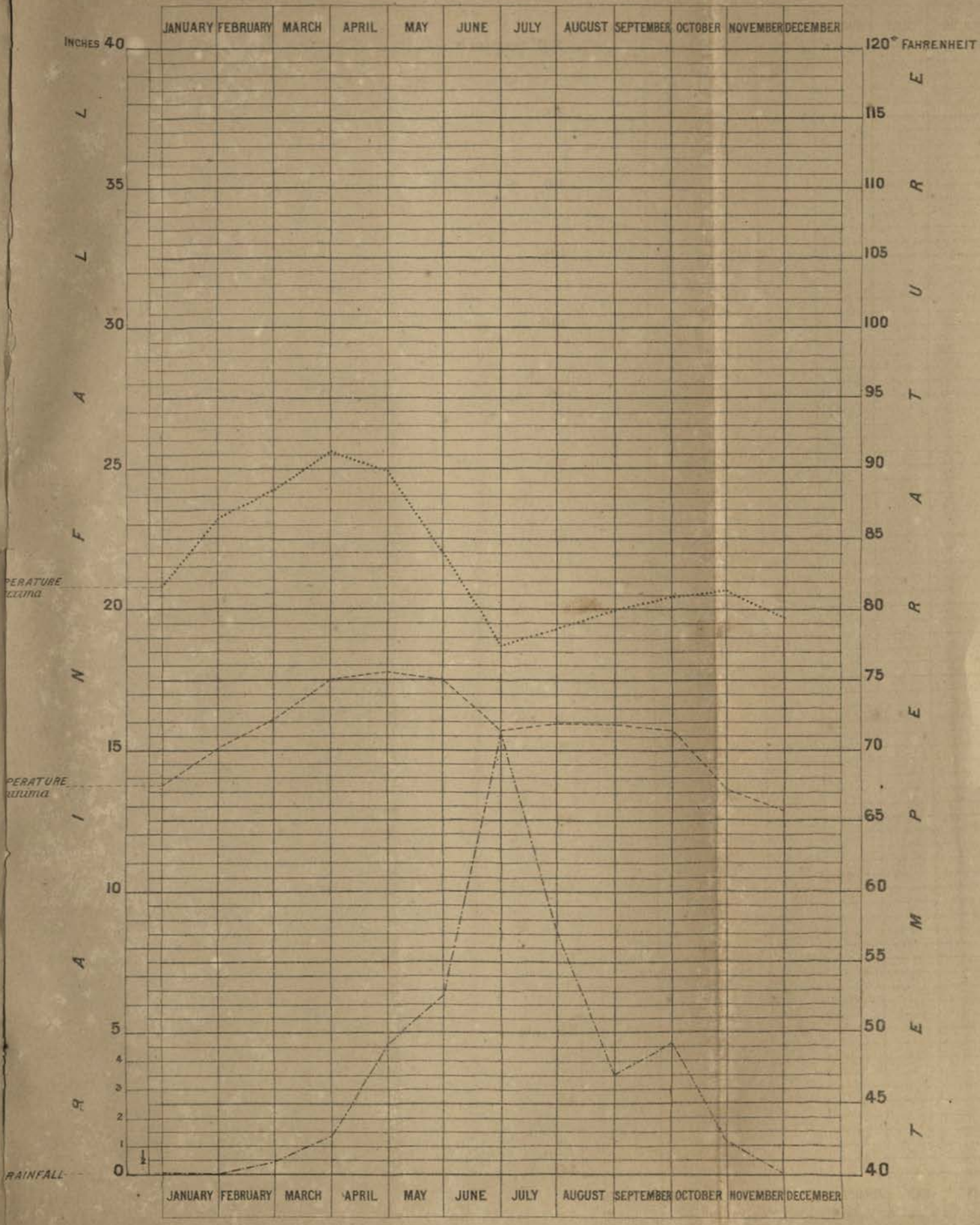
Prepared & Photozincographed Government Office Poona 1870

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT SHOLAPOOR FROM 1852 TO 1861 INCLUSIVE.



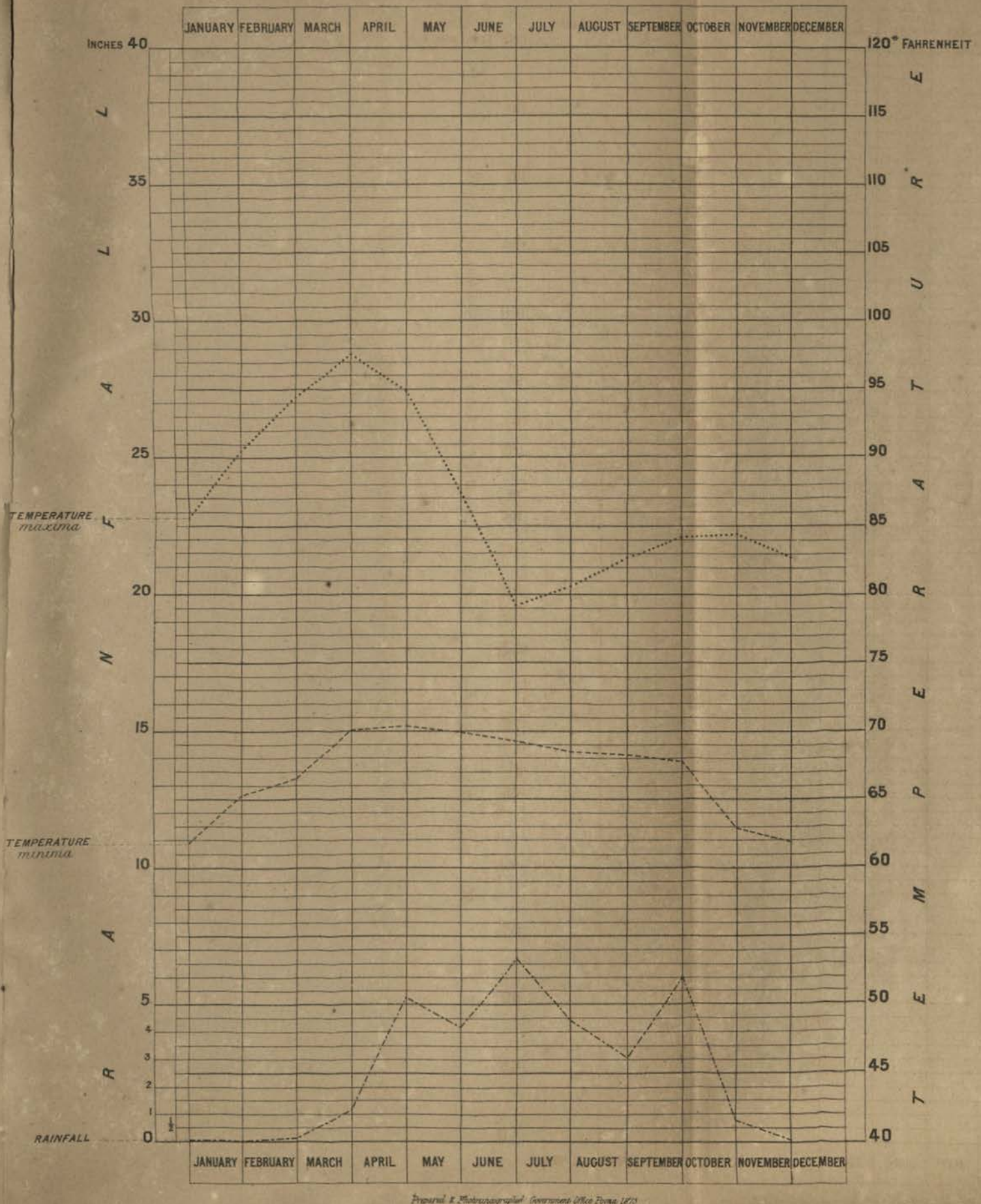
Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT BELGAUM FROM 1852 TO 1861 INCLUSIVE.



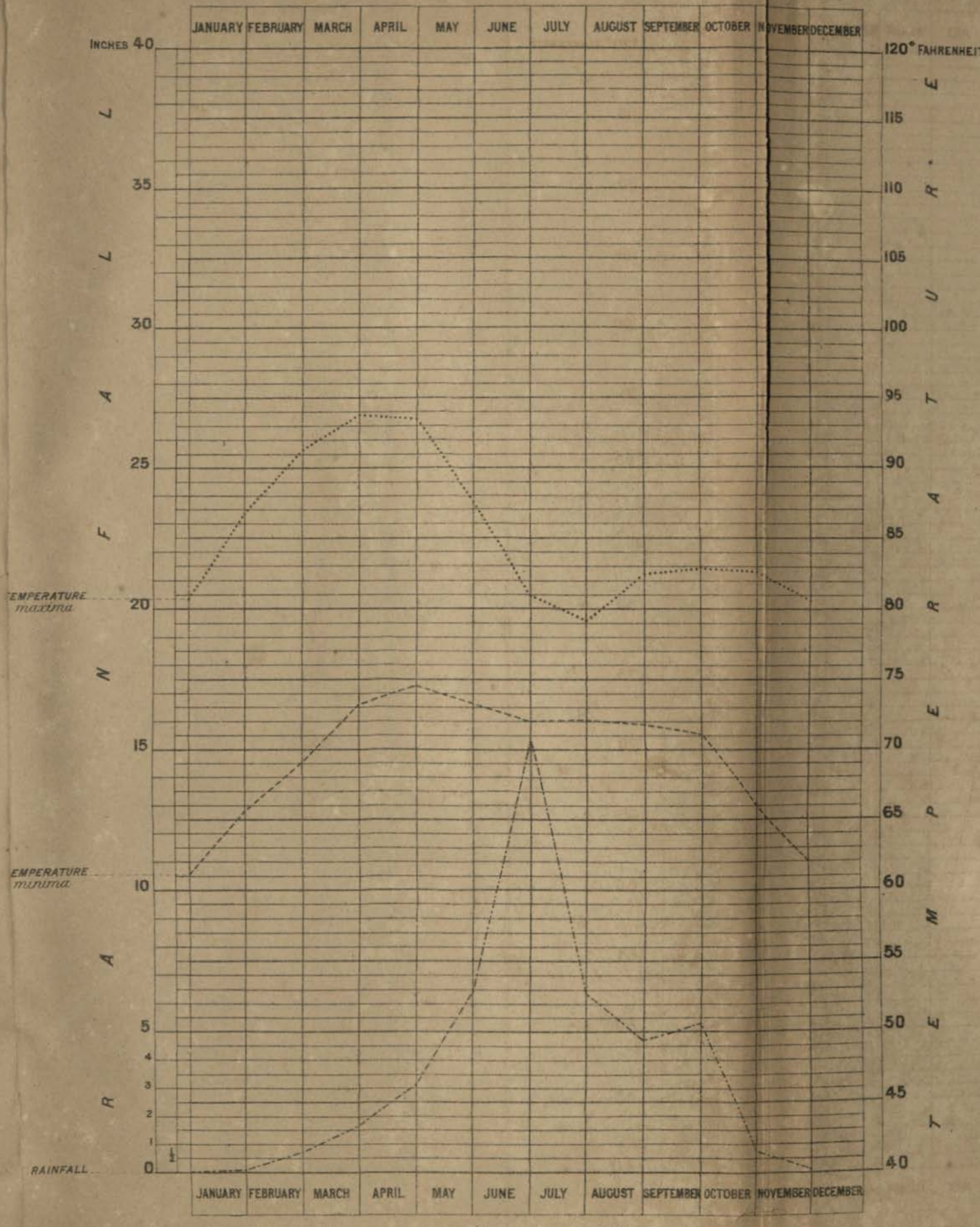
Prepared & Photozincographed Government Office Poona 1863.

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT DHARWAR FROM 1852 TO 1861 INCLUSIVE.



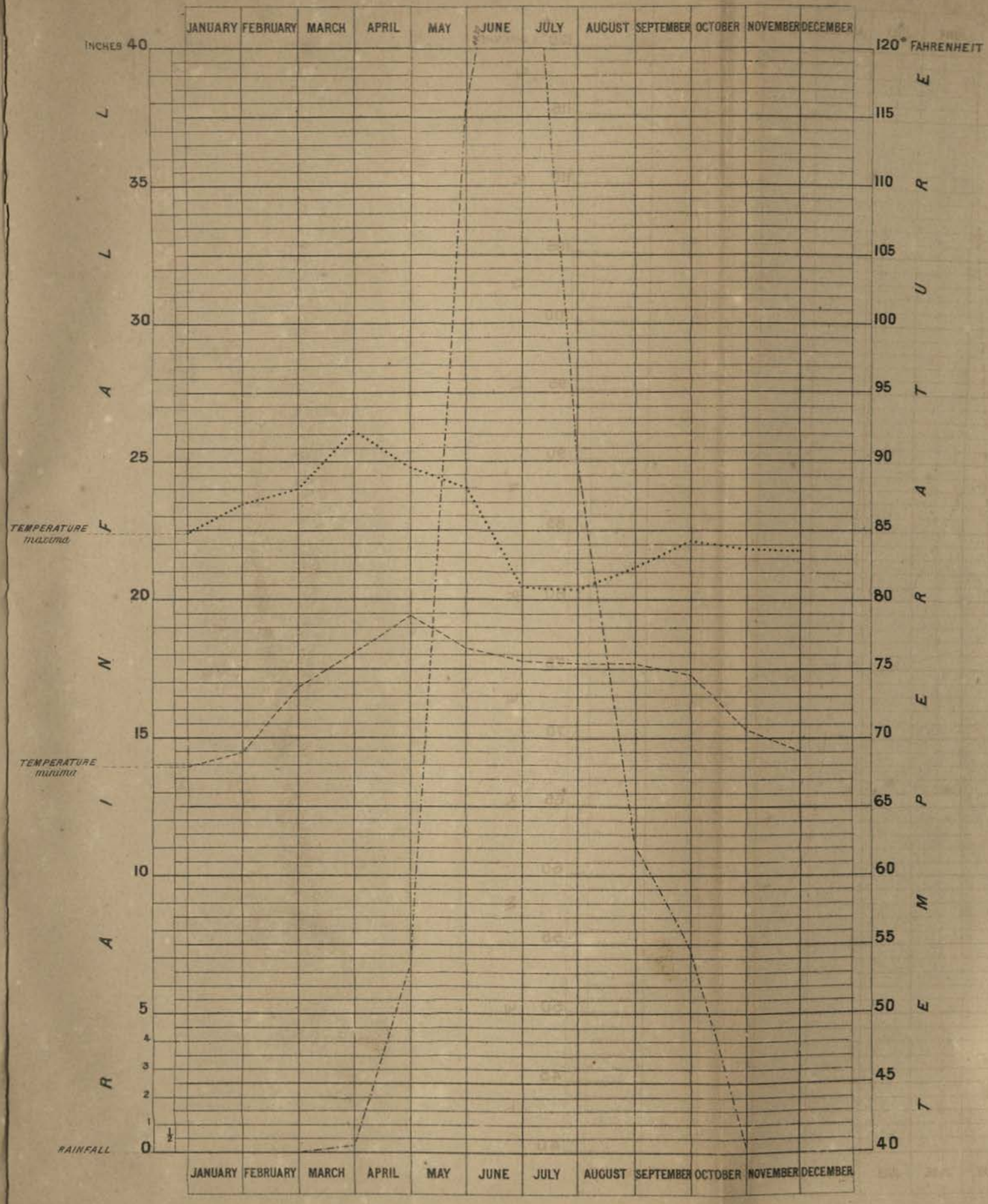
Prepared & Photozincographed Government Office Poona 1863

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT KOLAPOOR FROM 1852 TO 1861 INCLUSIVE.



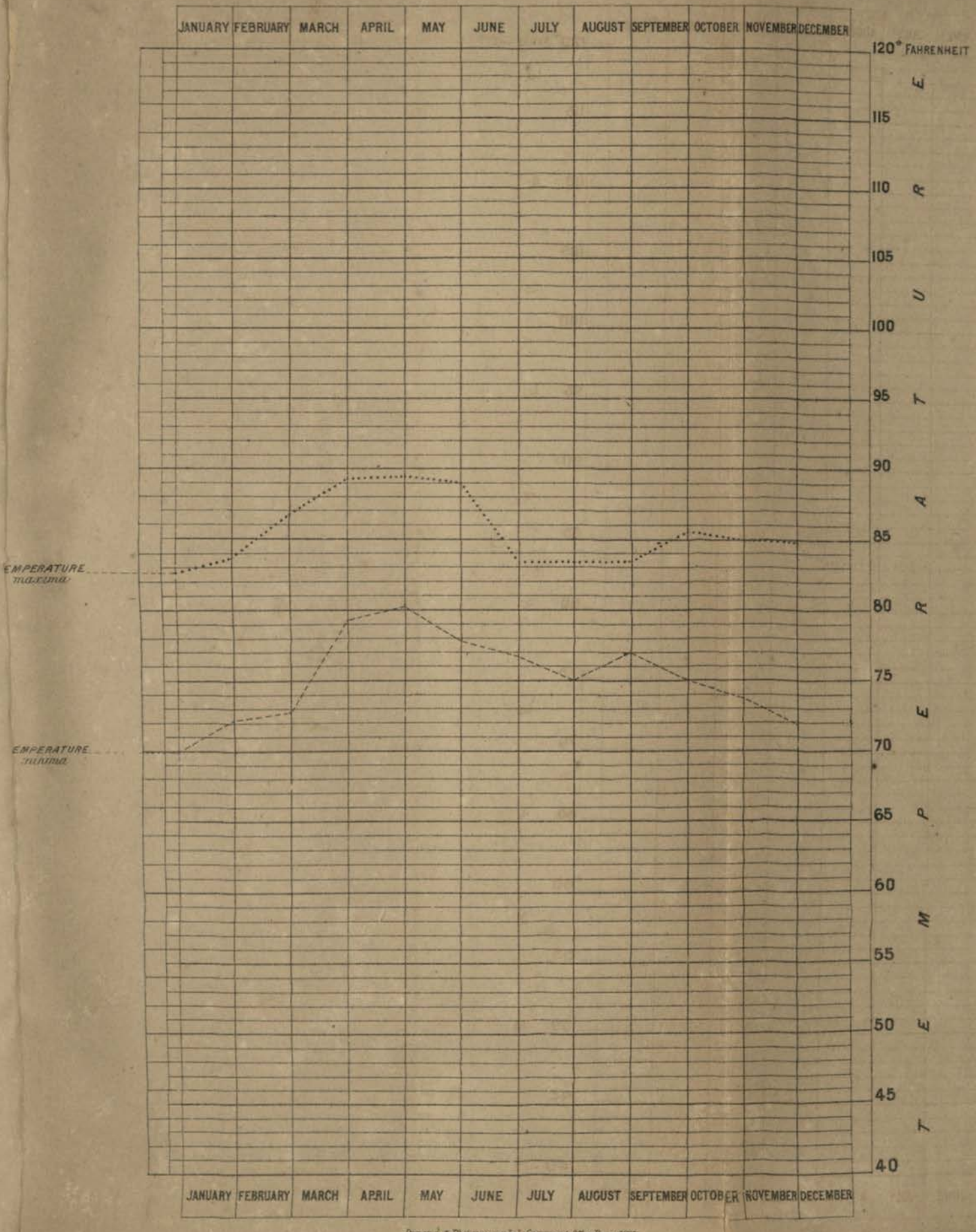
Prepared & Photozincographed Government Mint Press 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT SAWUNT WARREE FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1863

DIAGRAM SHOWING THE MAXIMA & MINIMA OF THE THERMOMETER AT RUTNACHERRY FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1863

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT TANNA FROM 1852 TO 1861 INCLUSIVE.

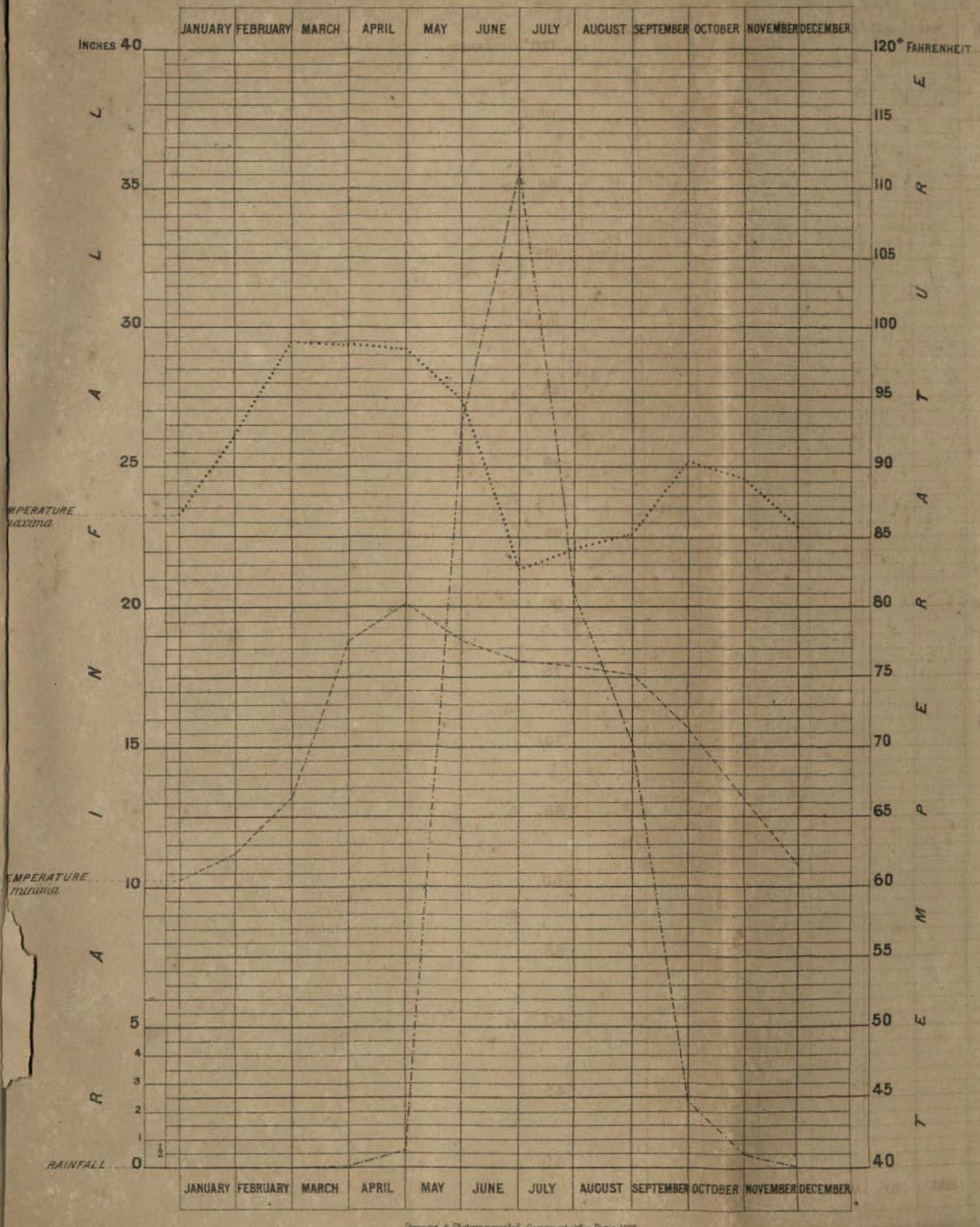
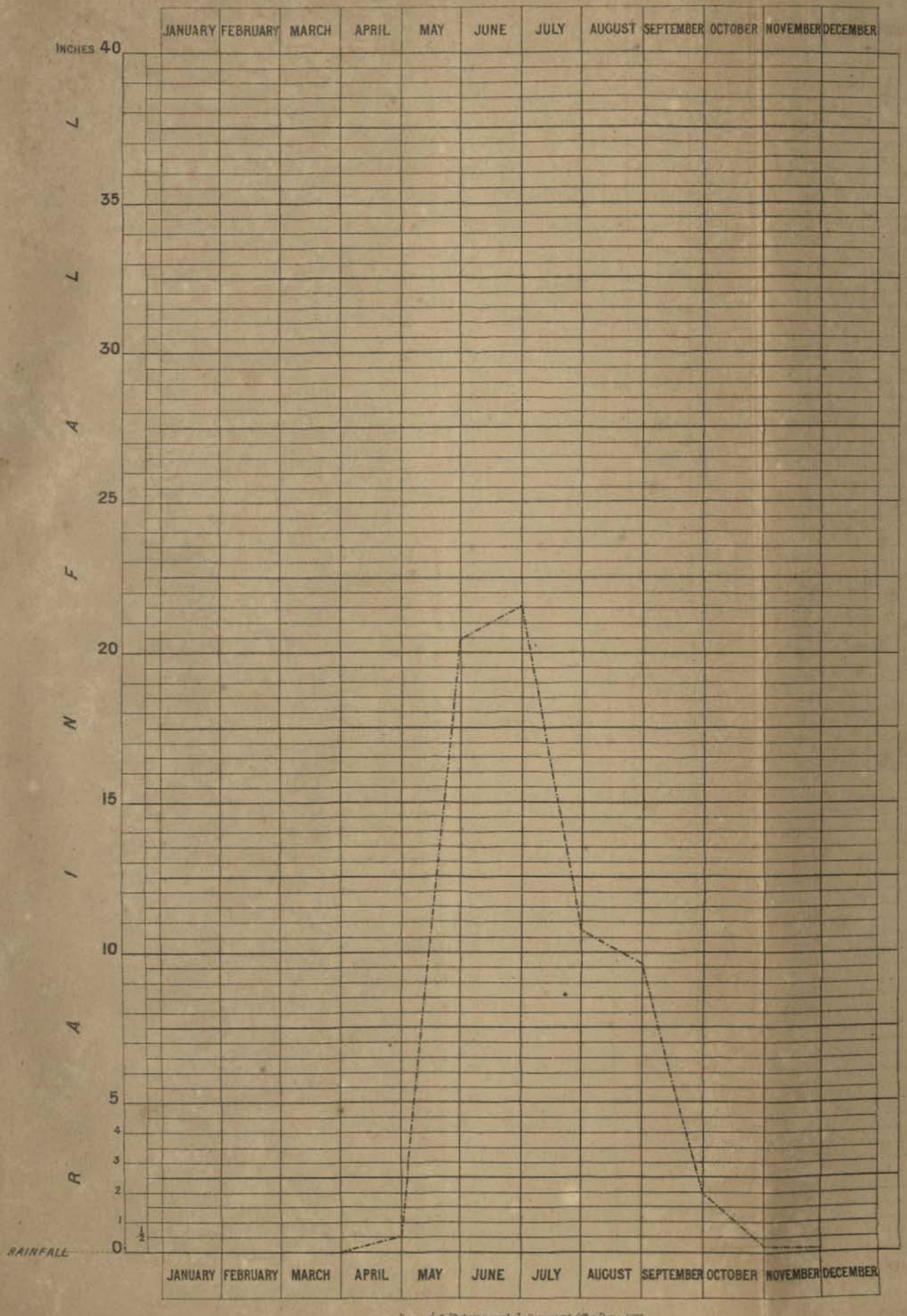


DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL AT BOMBAY OBSERVATORY, COLABA FROM 1852 TO 1861 INCLUSIVE.

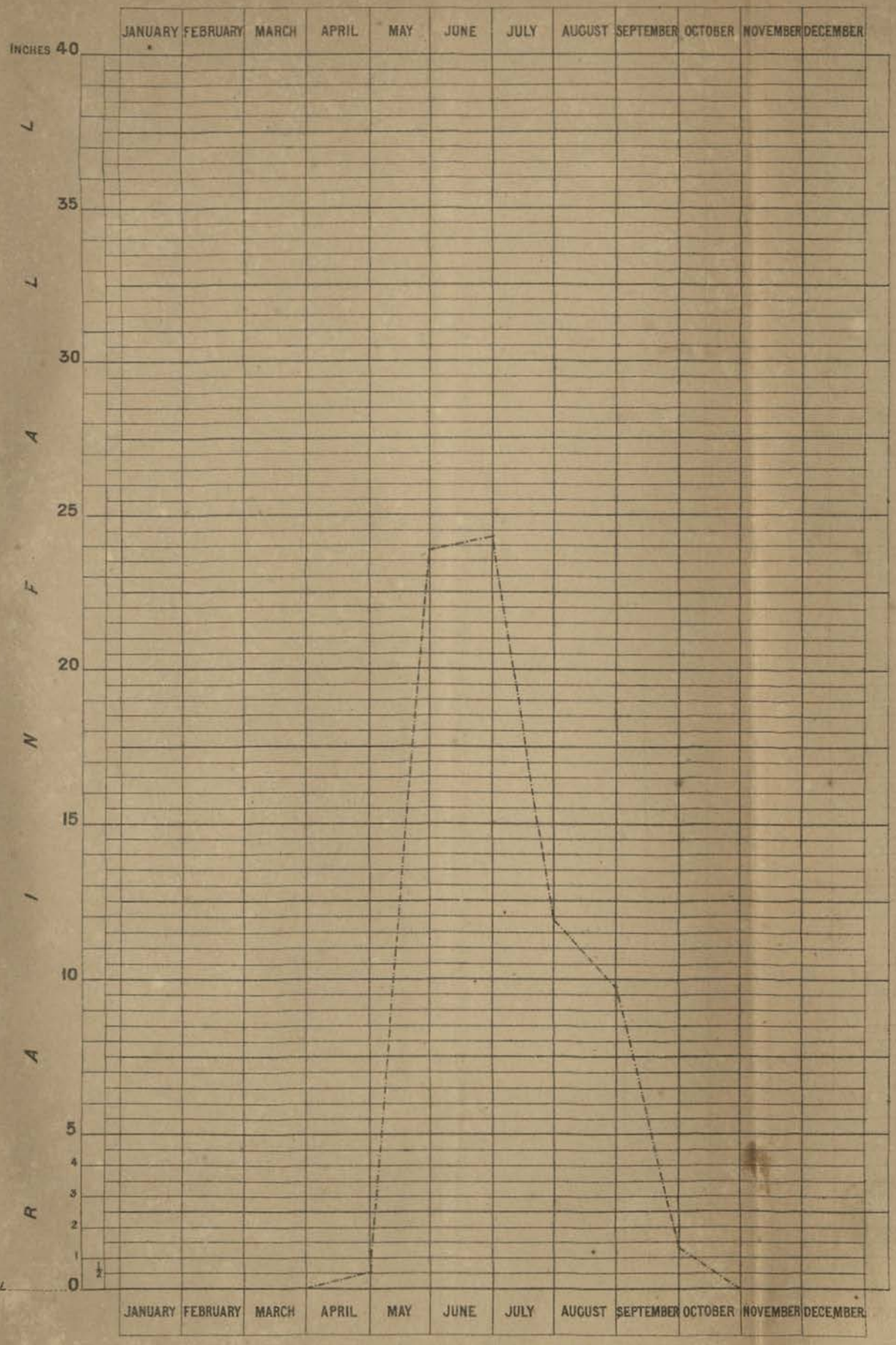


Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAINFALL

AT THE FORT, BOMBAY

FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1870

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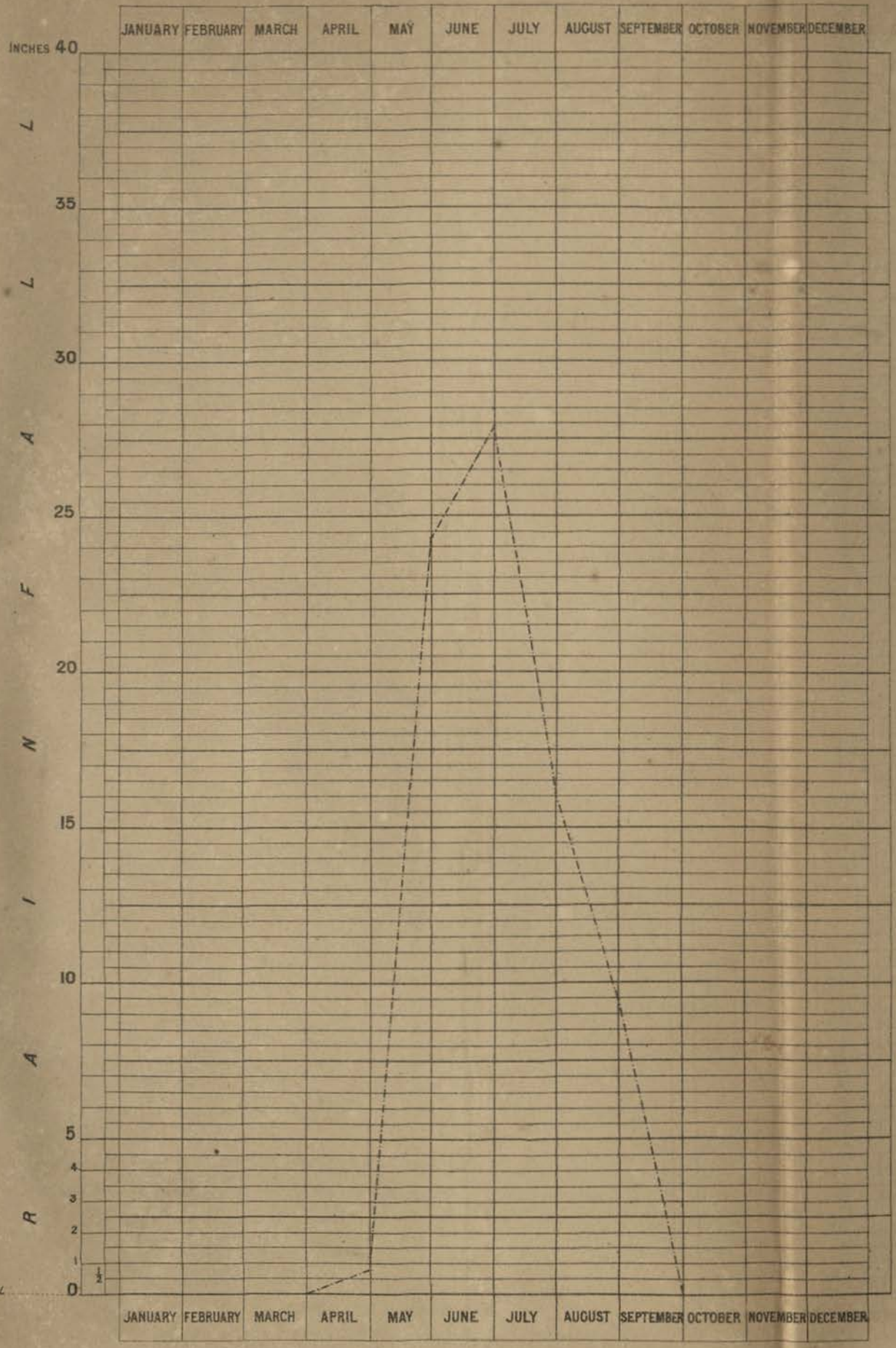
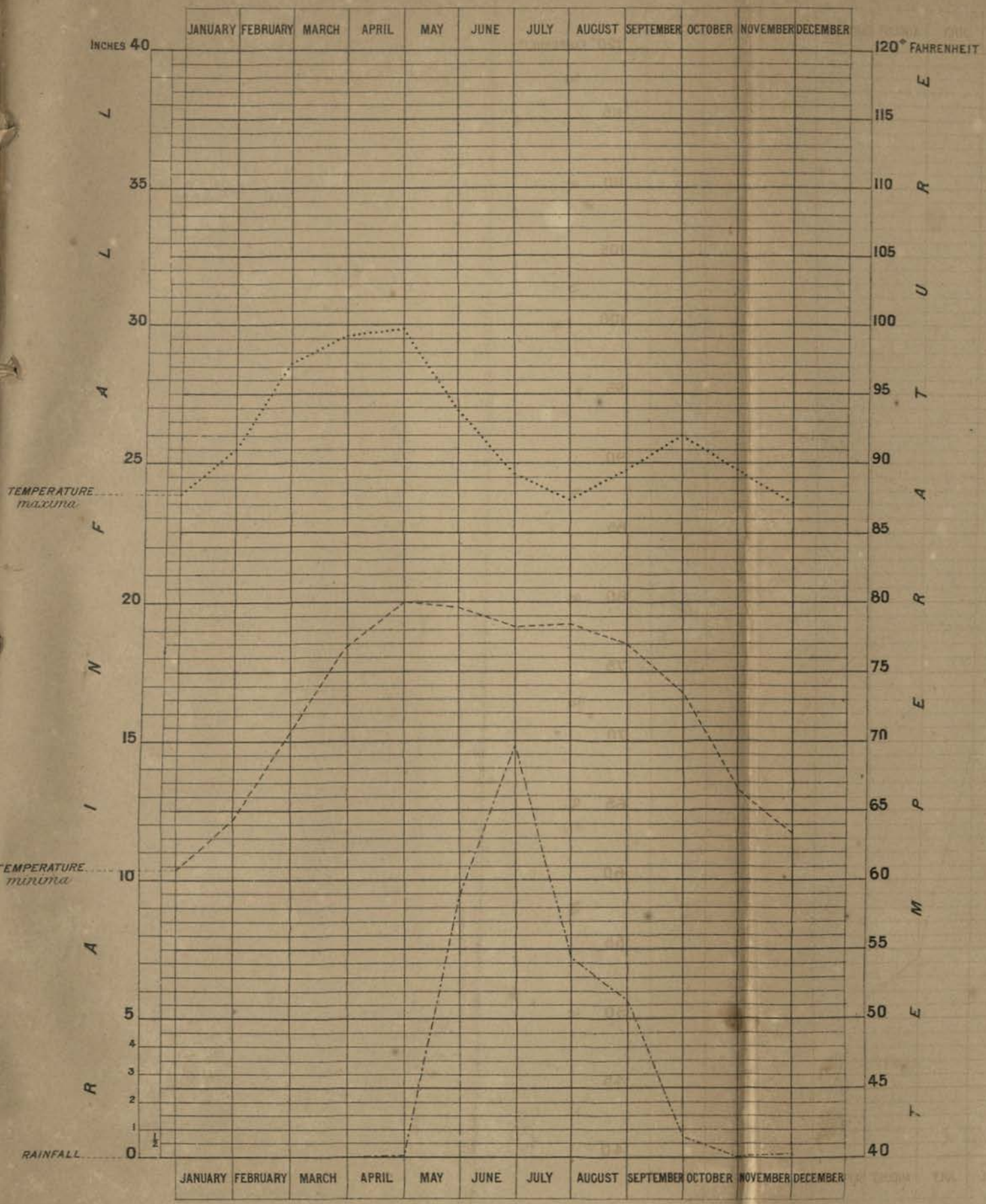


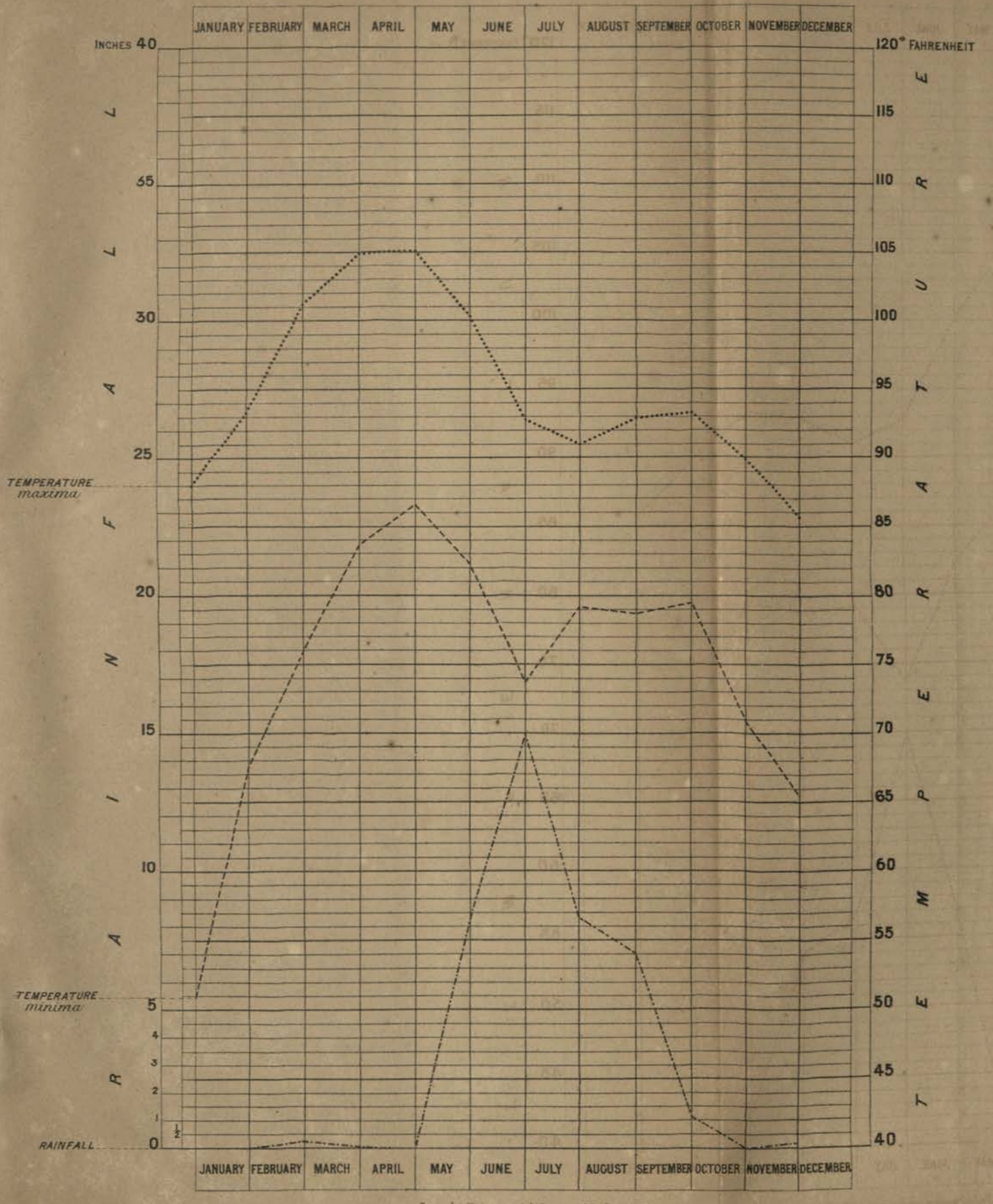
Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT SURAT FROM 1852 TO 1861 INCLUSIVE.



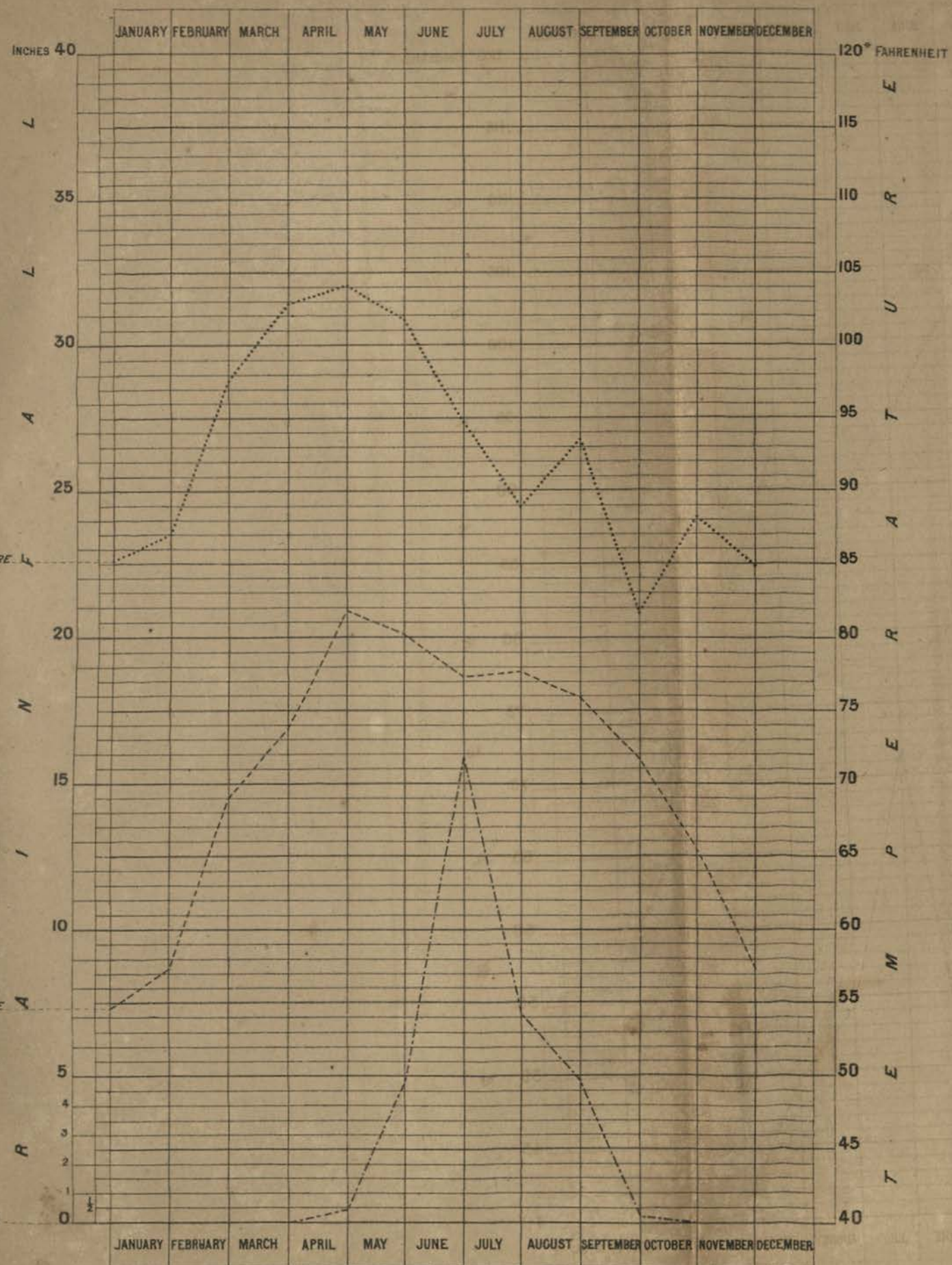
Prepared & Photozincographed at Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT BROACH FROM 1852 TO 1861 INCLUSIVE.



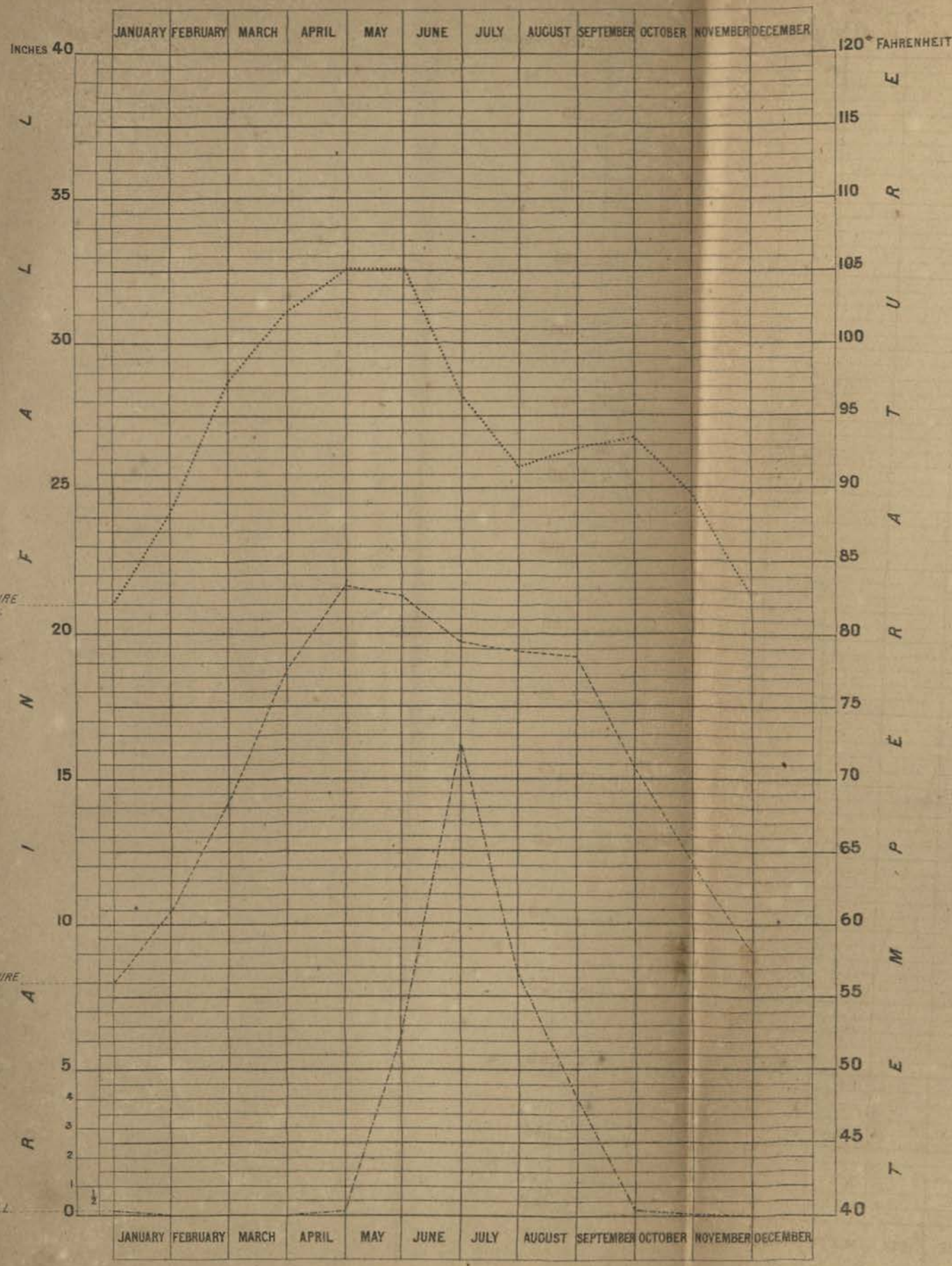
Prepared & Photozincographed Government Office Poona 1870

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT KAIRA FROM 1852 TO 1861 INCLUSIVE.



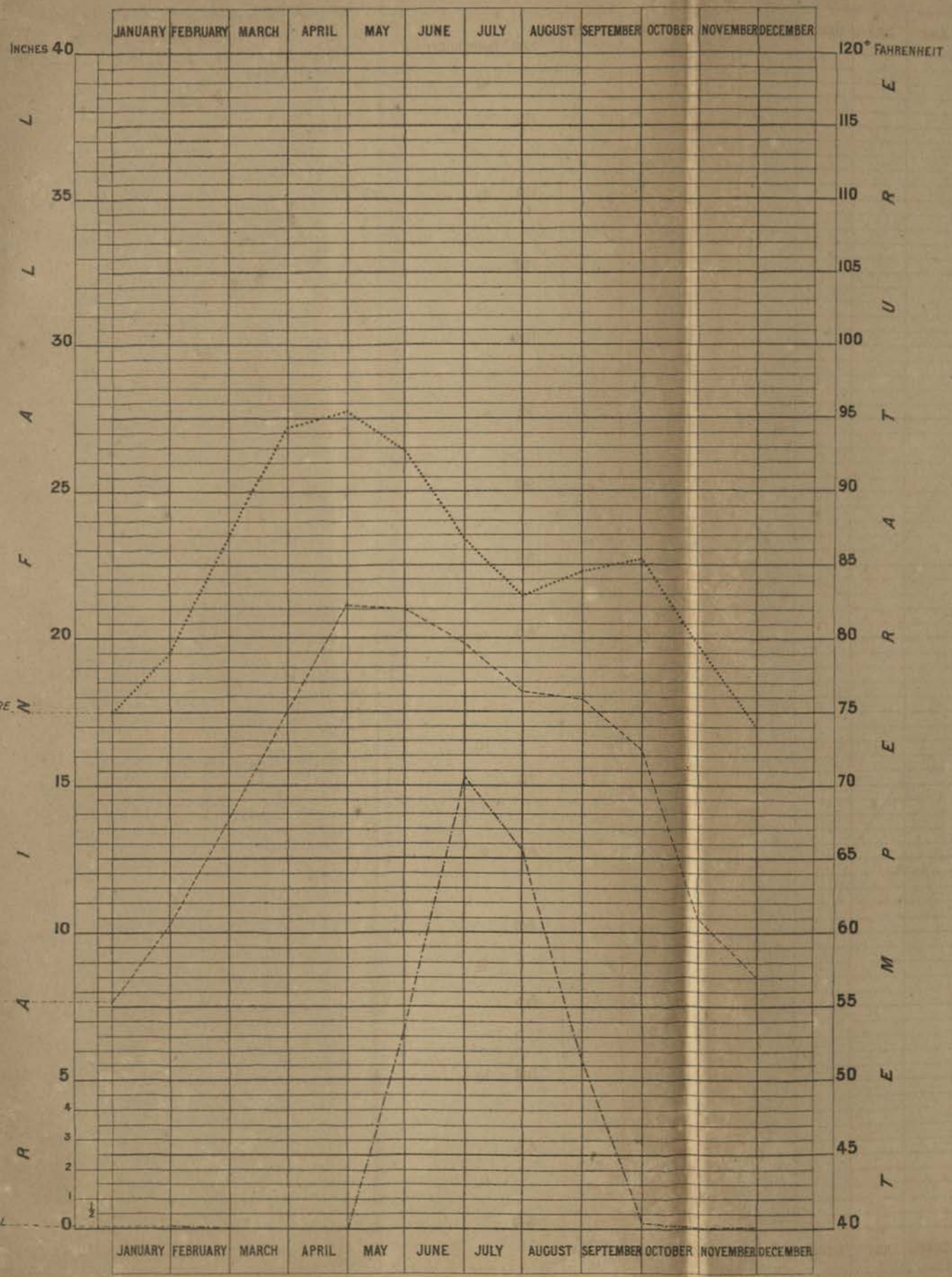
Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT AHMEDABAD FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photolithographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT BARODA FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Bombay 1870

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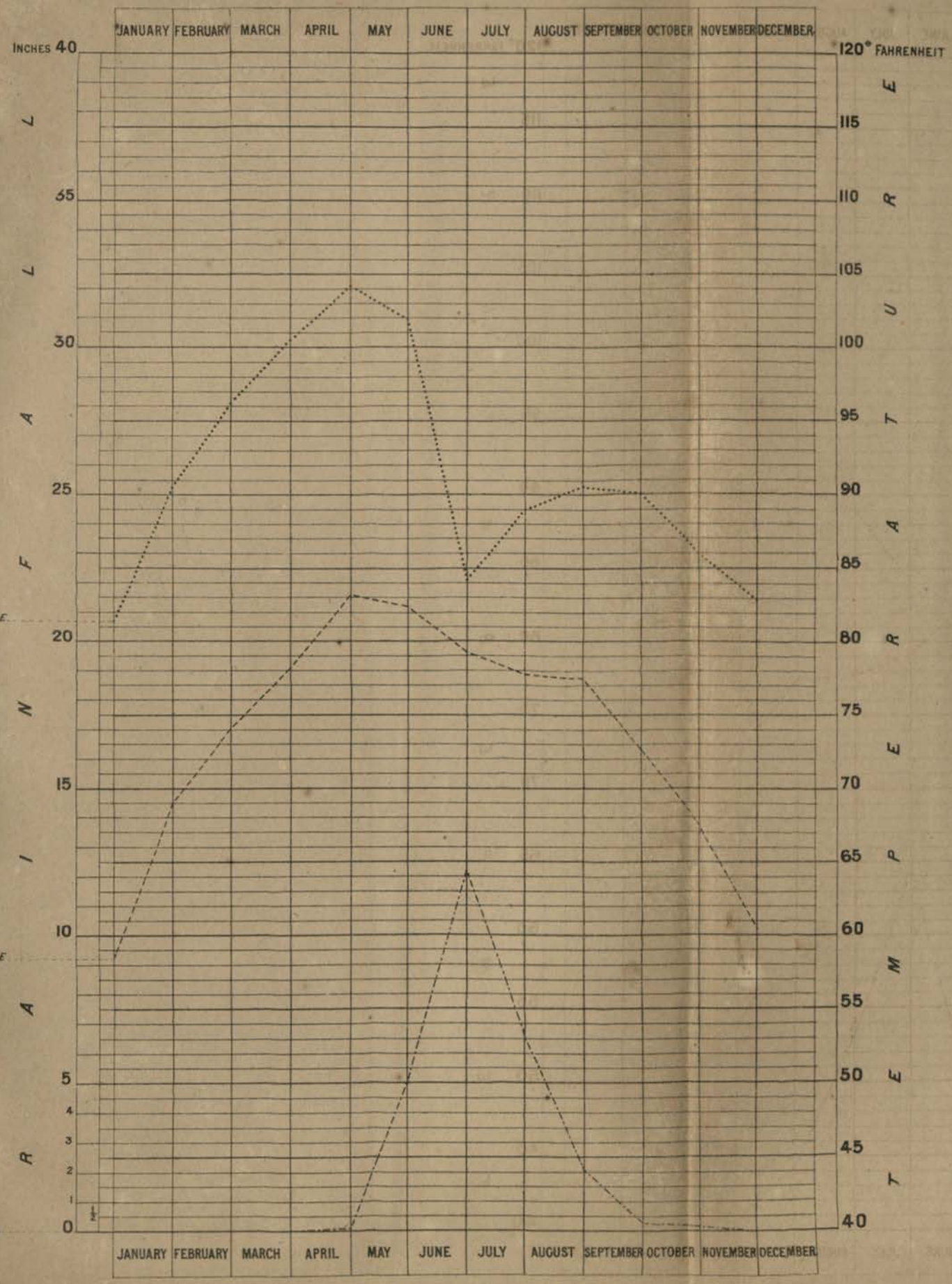
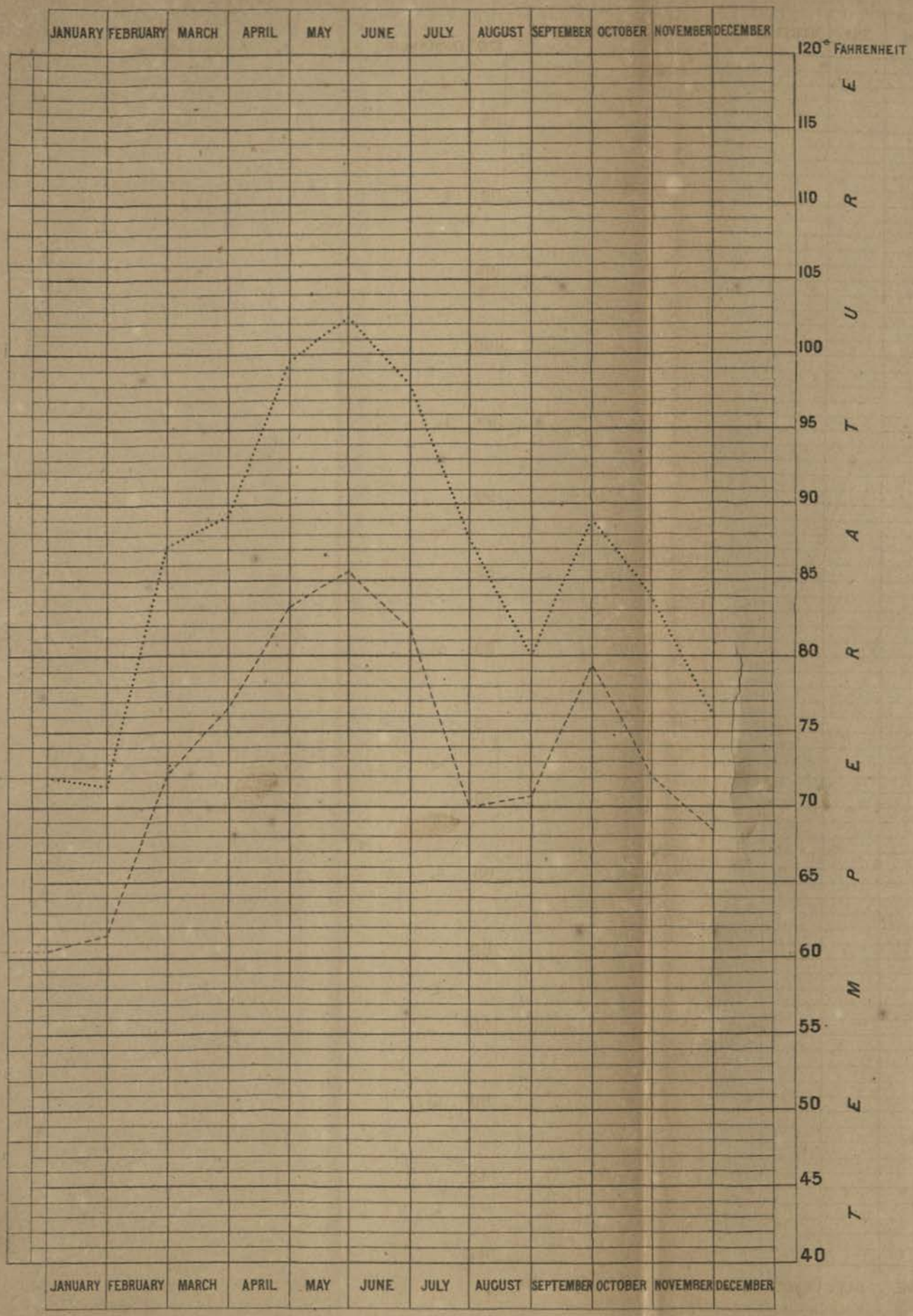


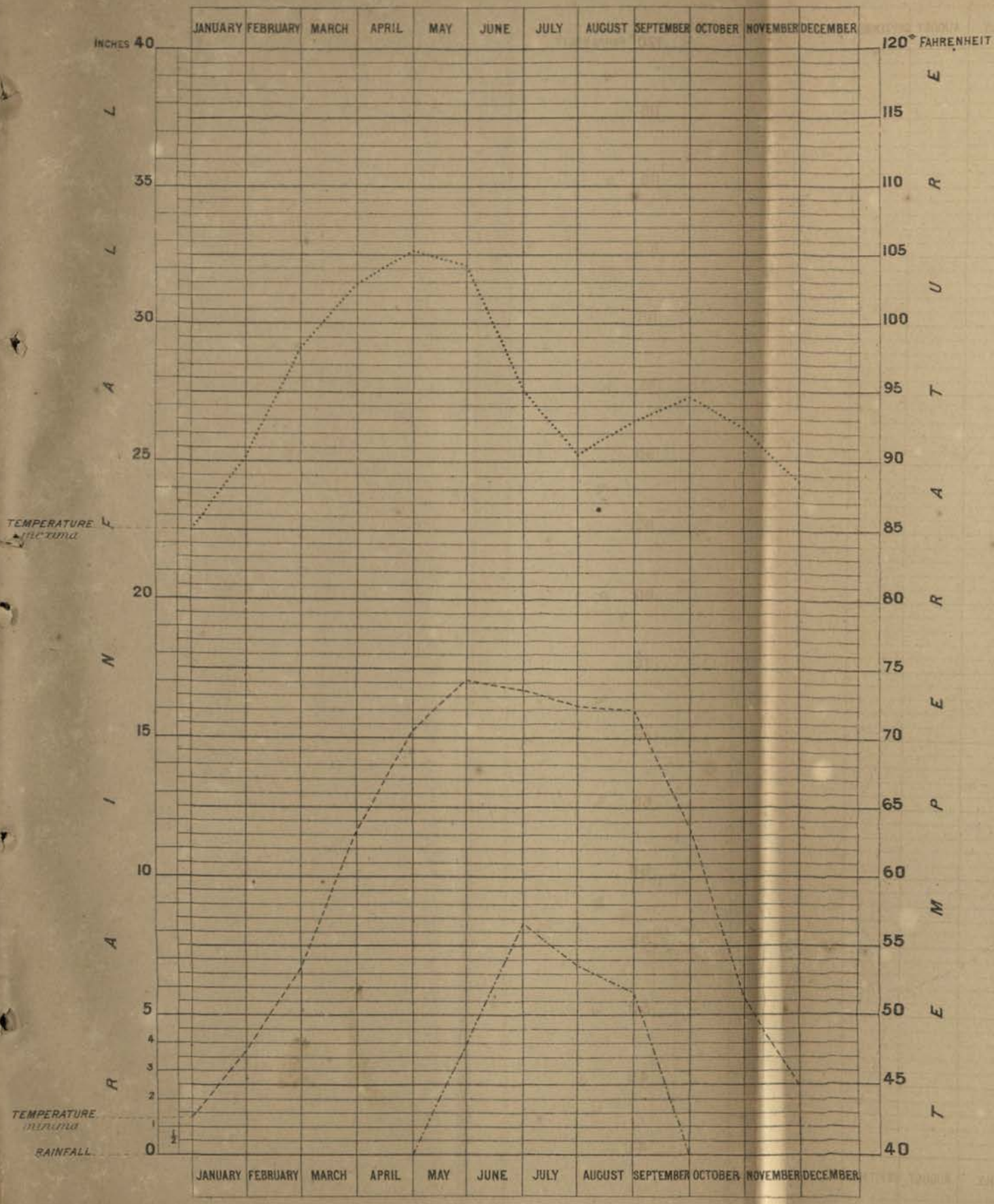
Prepared & Photozincographed Government Office Poona 1863

DIAGRAM SHOWING THE MAXIMA & MINIMA OF THE THERMOMETER AT PAHLUNPUR FROM 1852 TO 1861 INCLUSIVE.



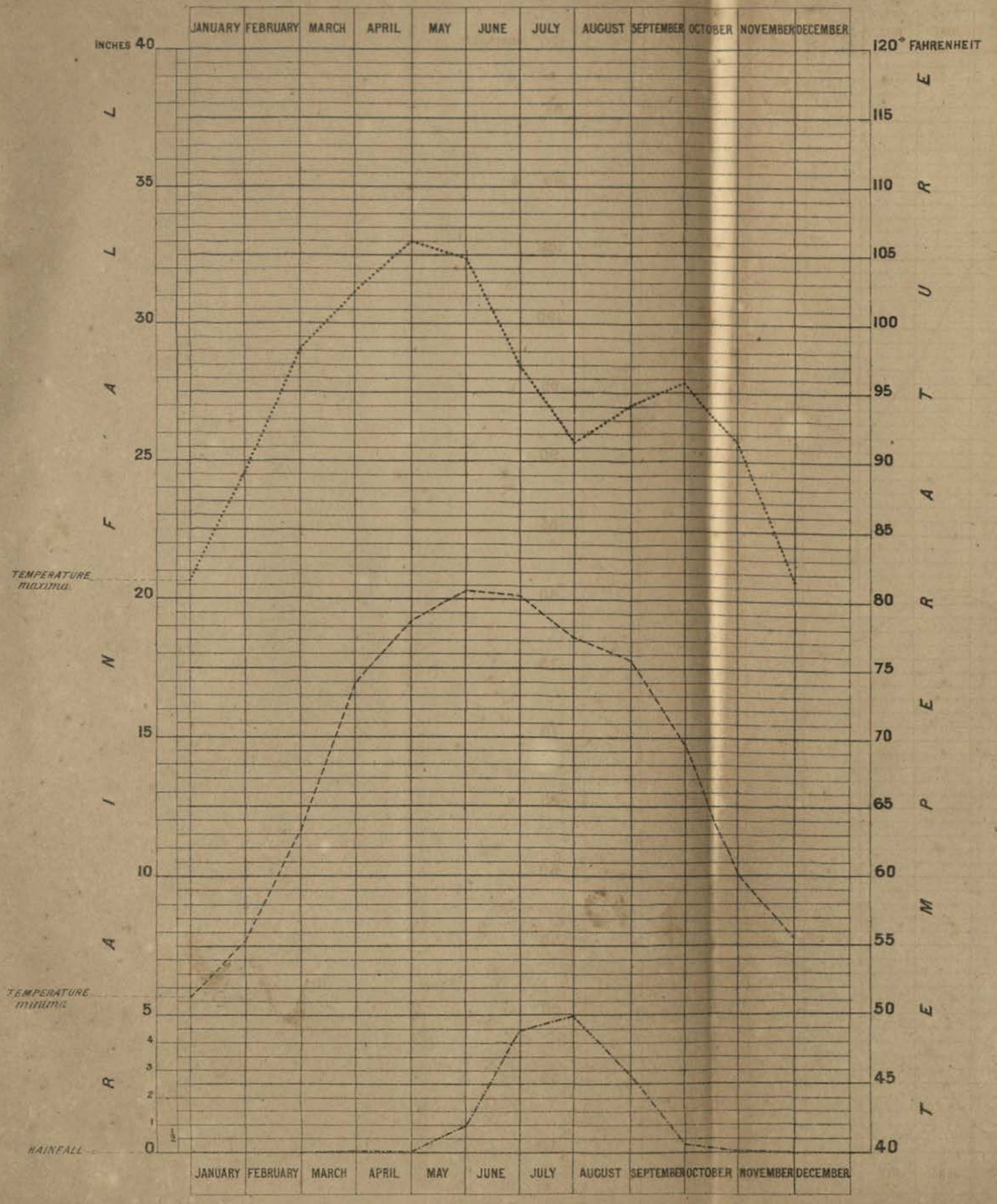
Prepared & Photozincographed Government Office Poona 1874

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT KATTIAWAR FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Bombay 1863.

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL & MAXIMA & MINIMA OF THE THERMOMETER AT BHOOJ, CUTCH FROM 1852 TO 1861 INCLUSIVE.



Prepared & Photozincographed Government Office Bombay 1862

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
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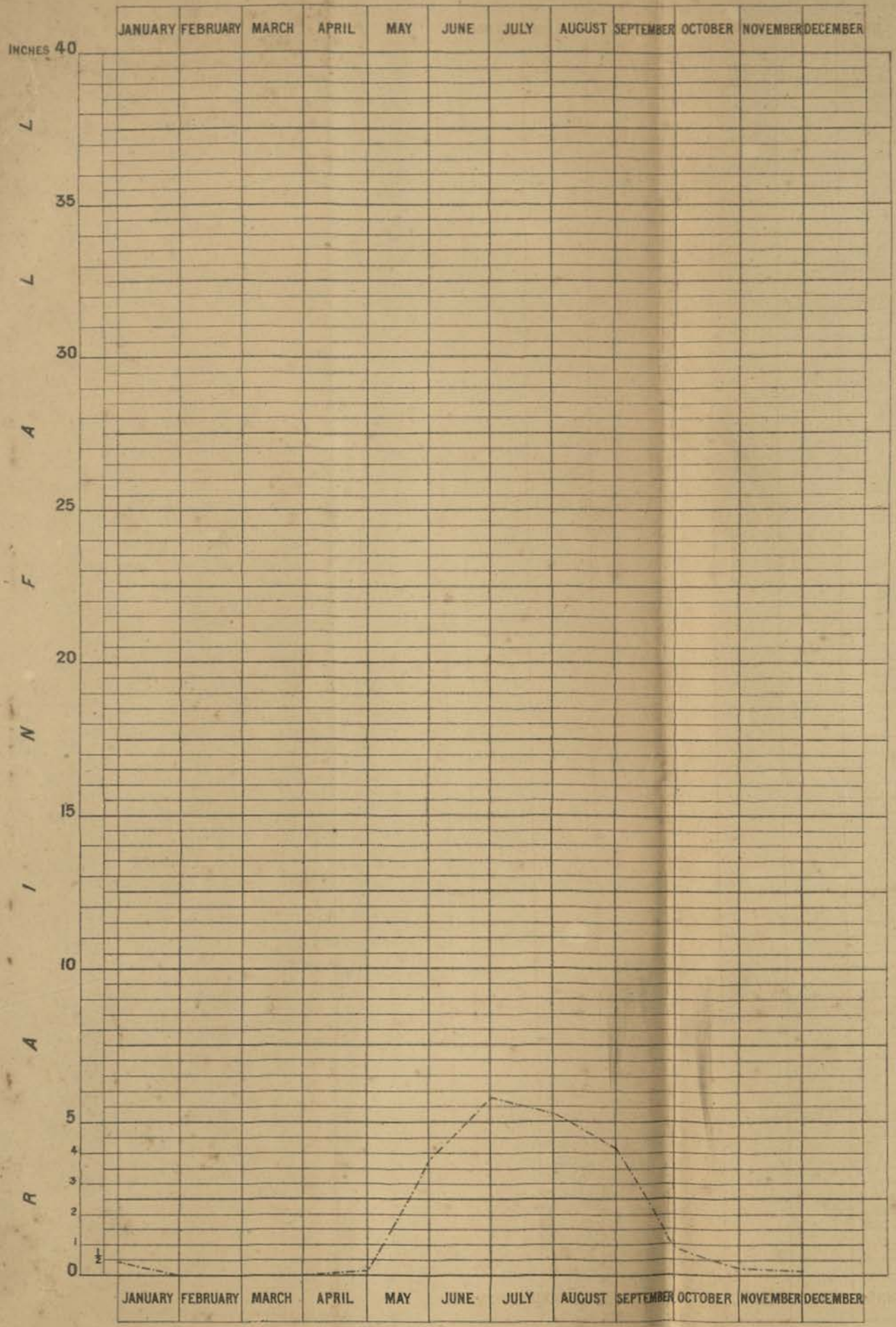
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
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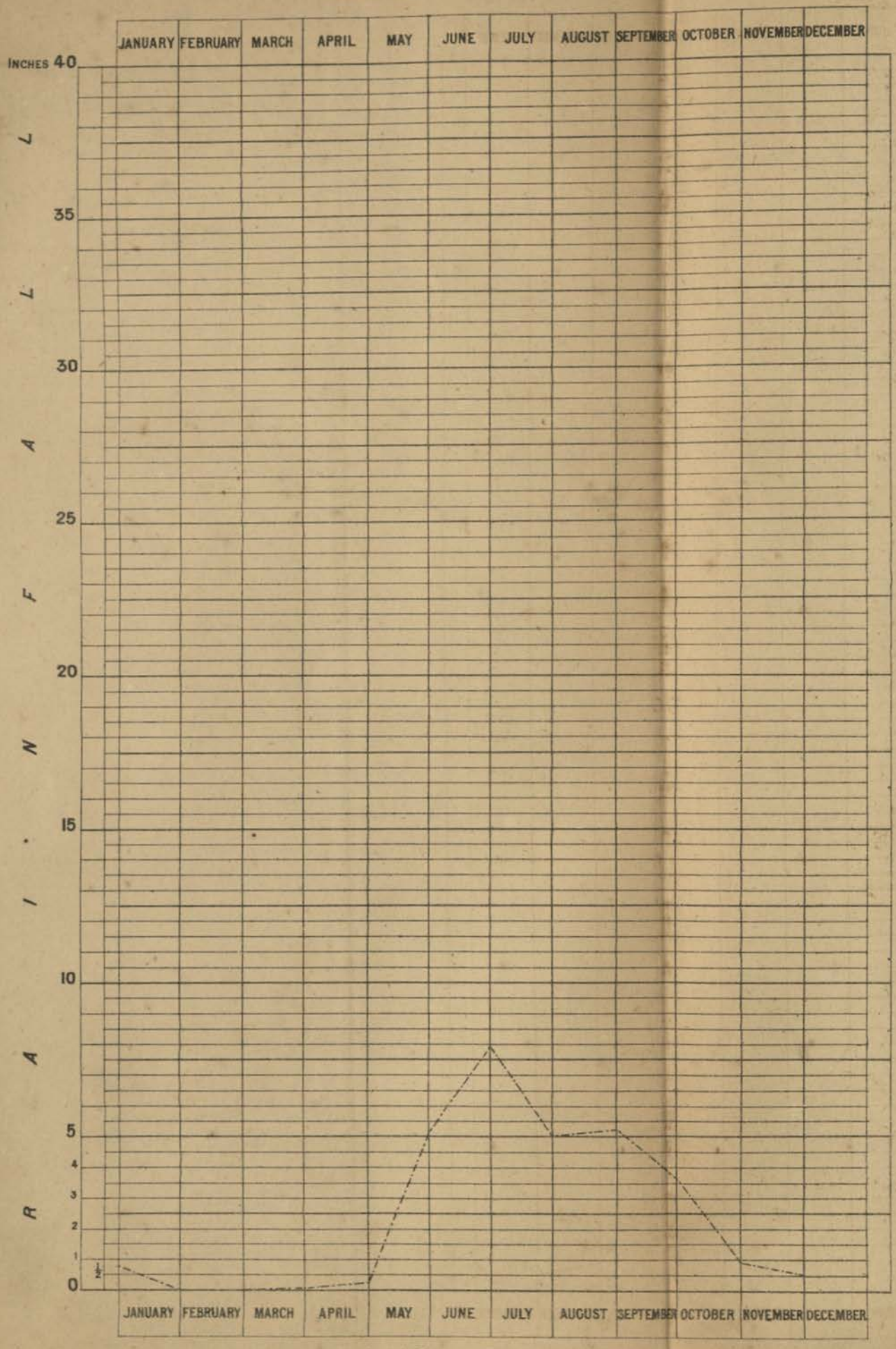

Prepared & Photozincographed at Government Office, Poona, 1872.

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
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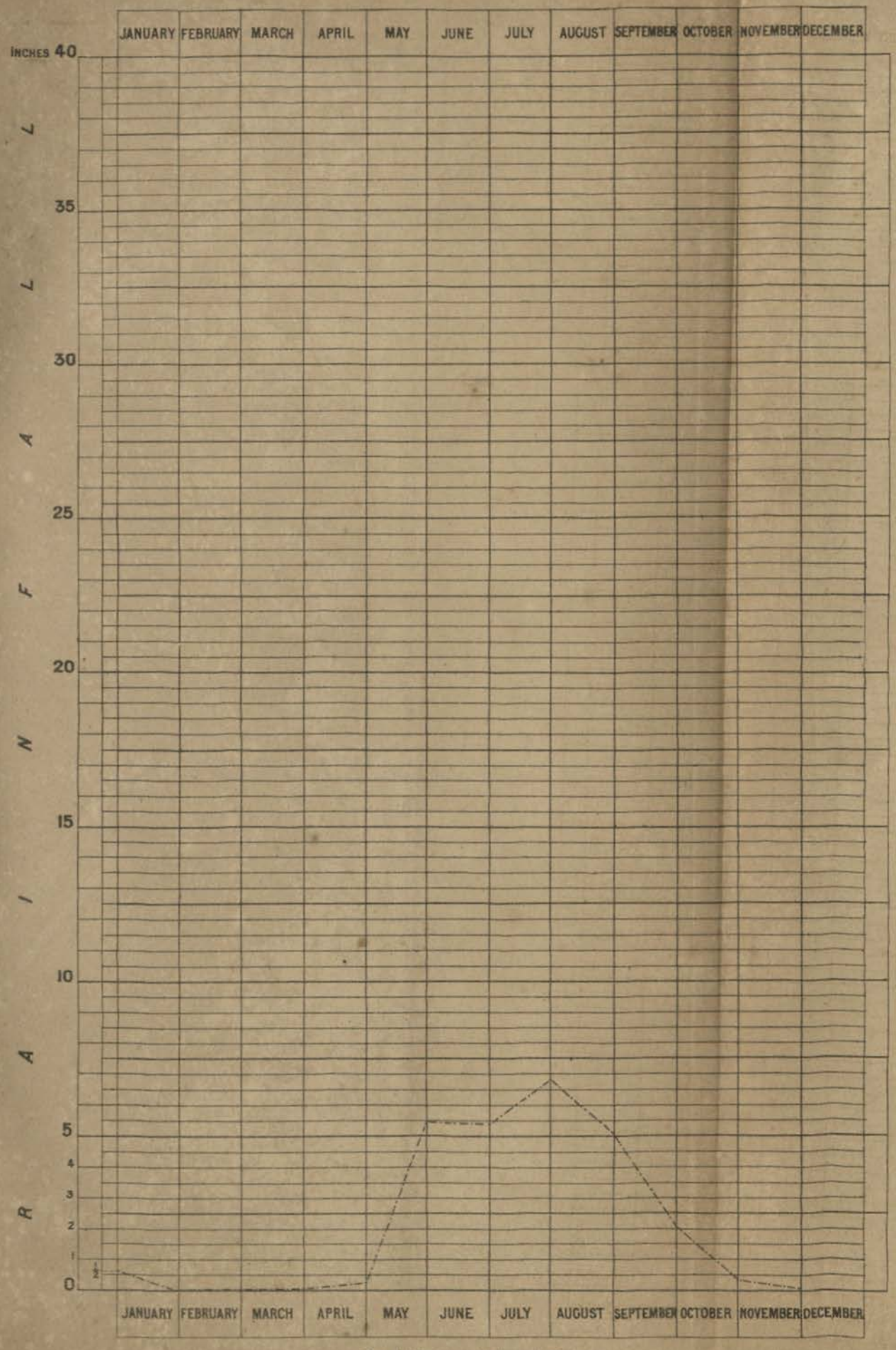

Prepared & Photozincographed Government Office Poona 1873

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POONA COLLECTORATE
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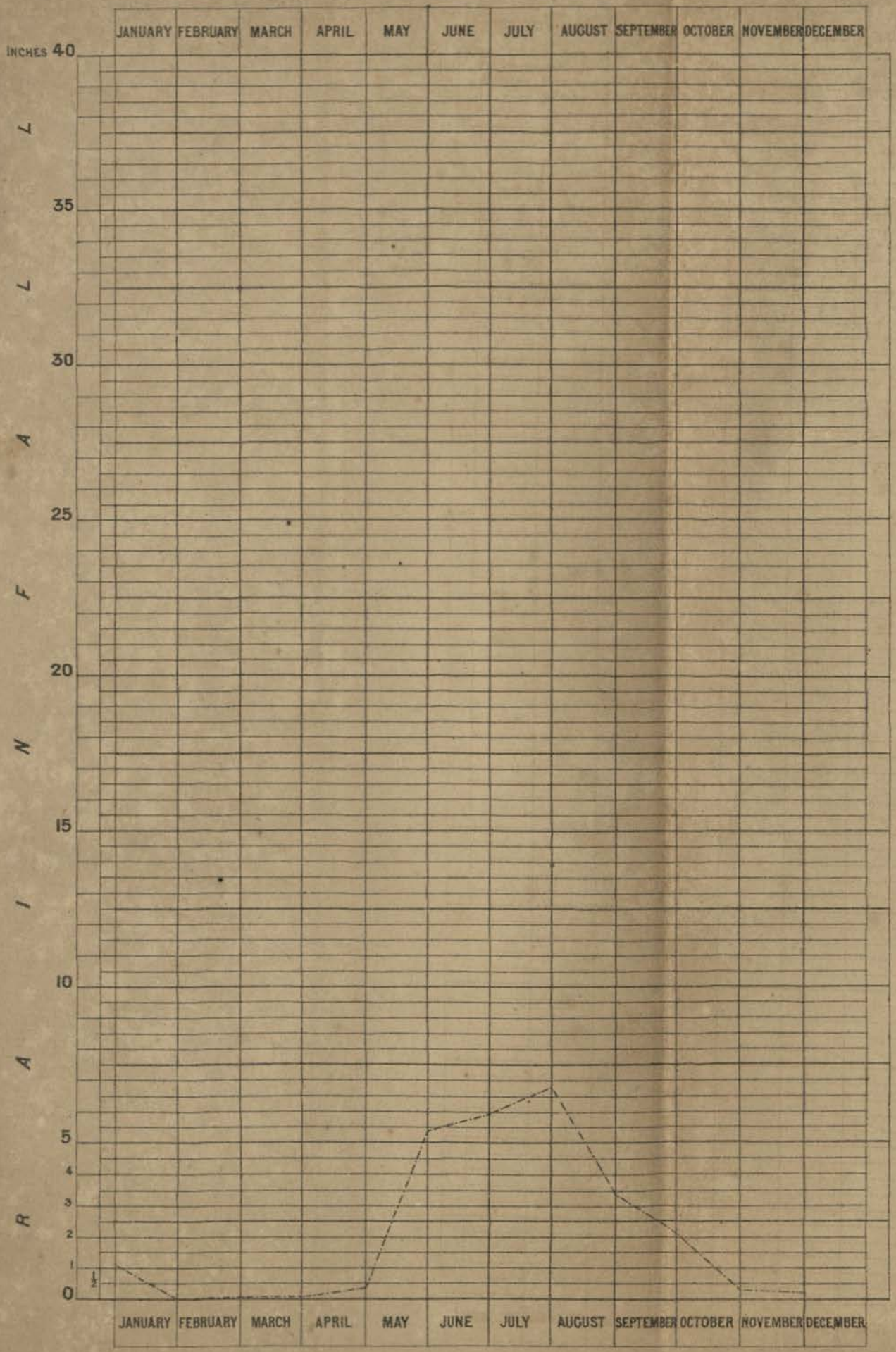

Prepared & Photozincographed Government Office Poona 1873.

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SATARA COLLECTORATE
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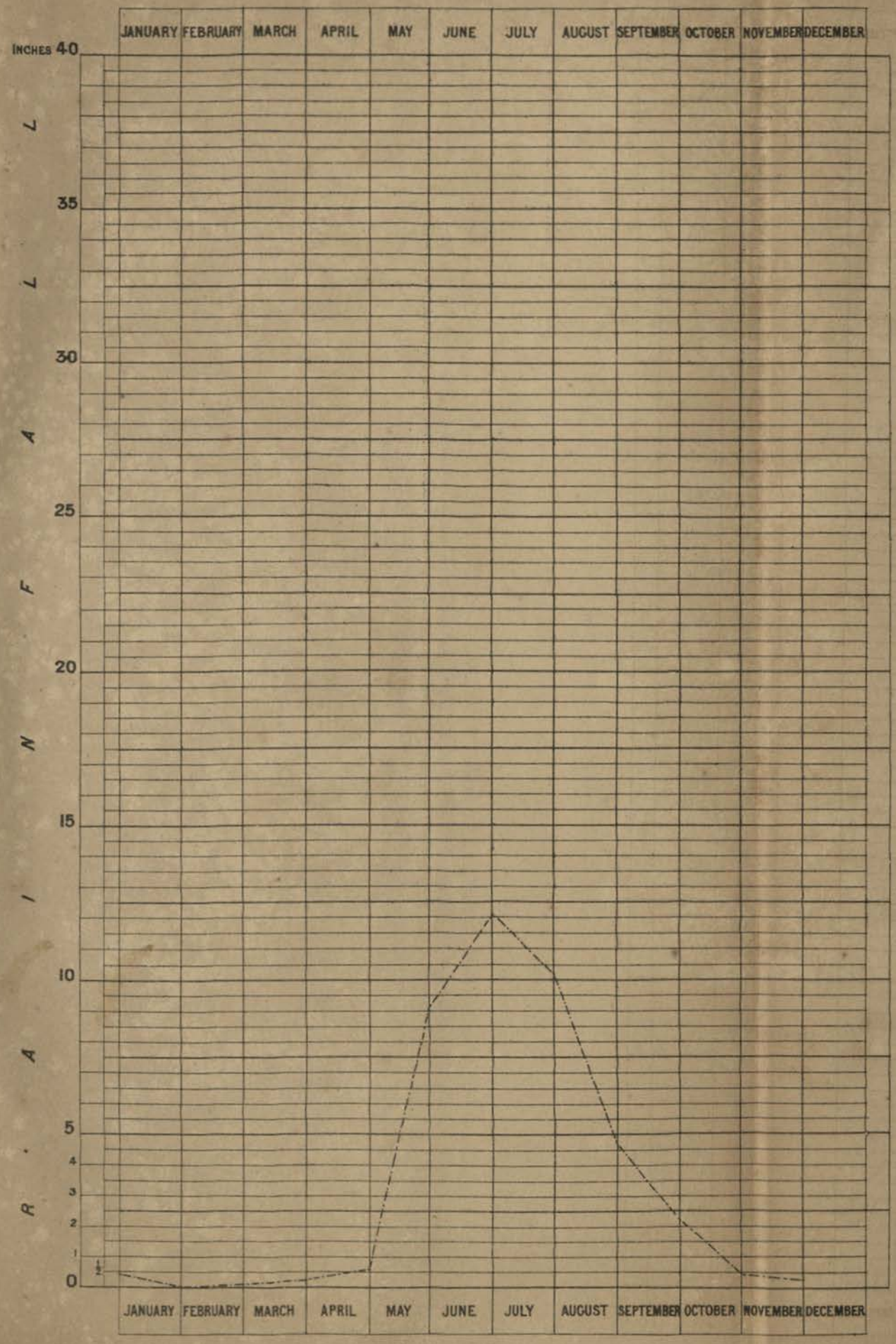

Prepared & Photozincographed Government Office Poona 1872

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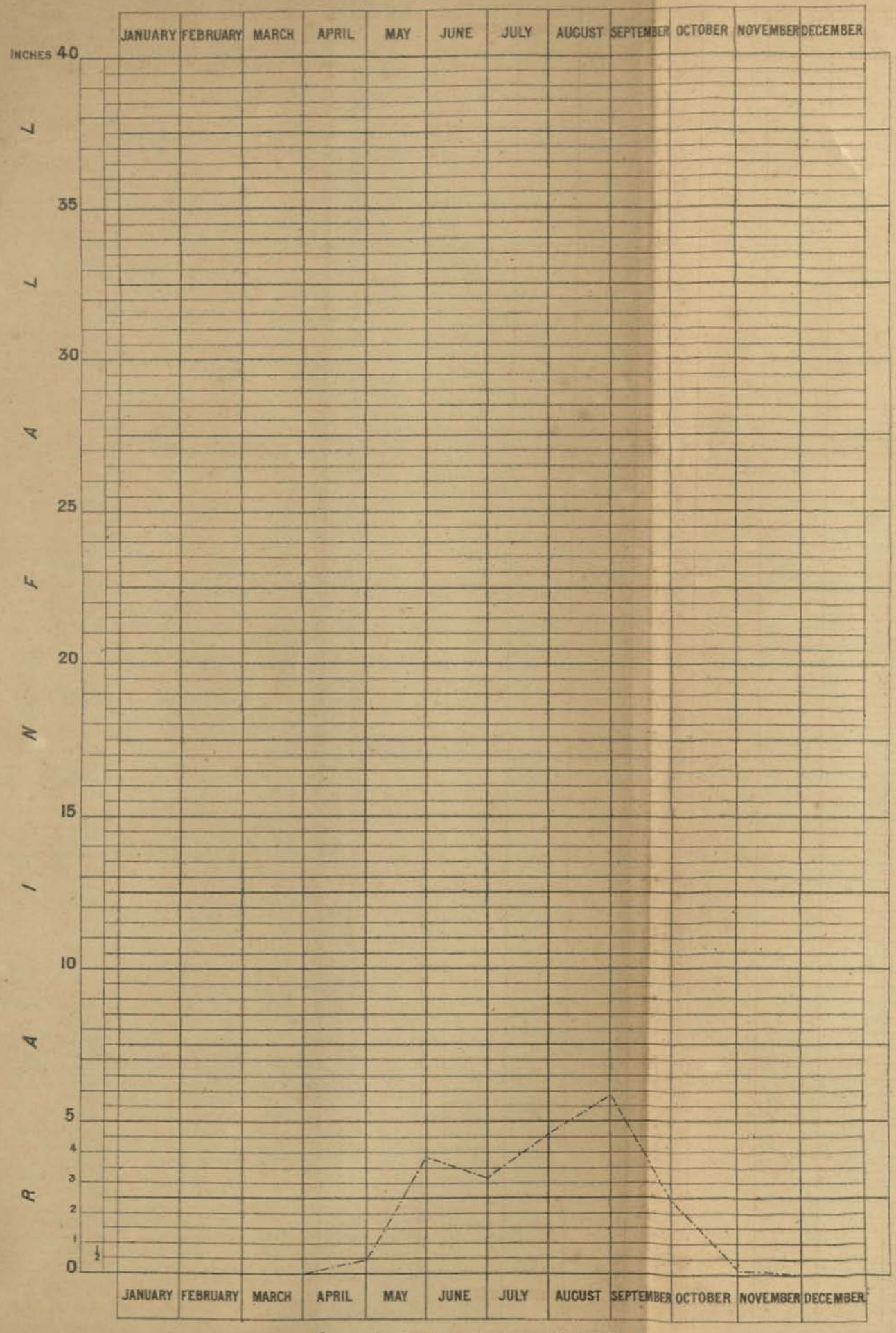

Prepared & Photozincographed Government Office Poona 1873

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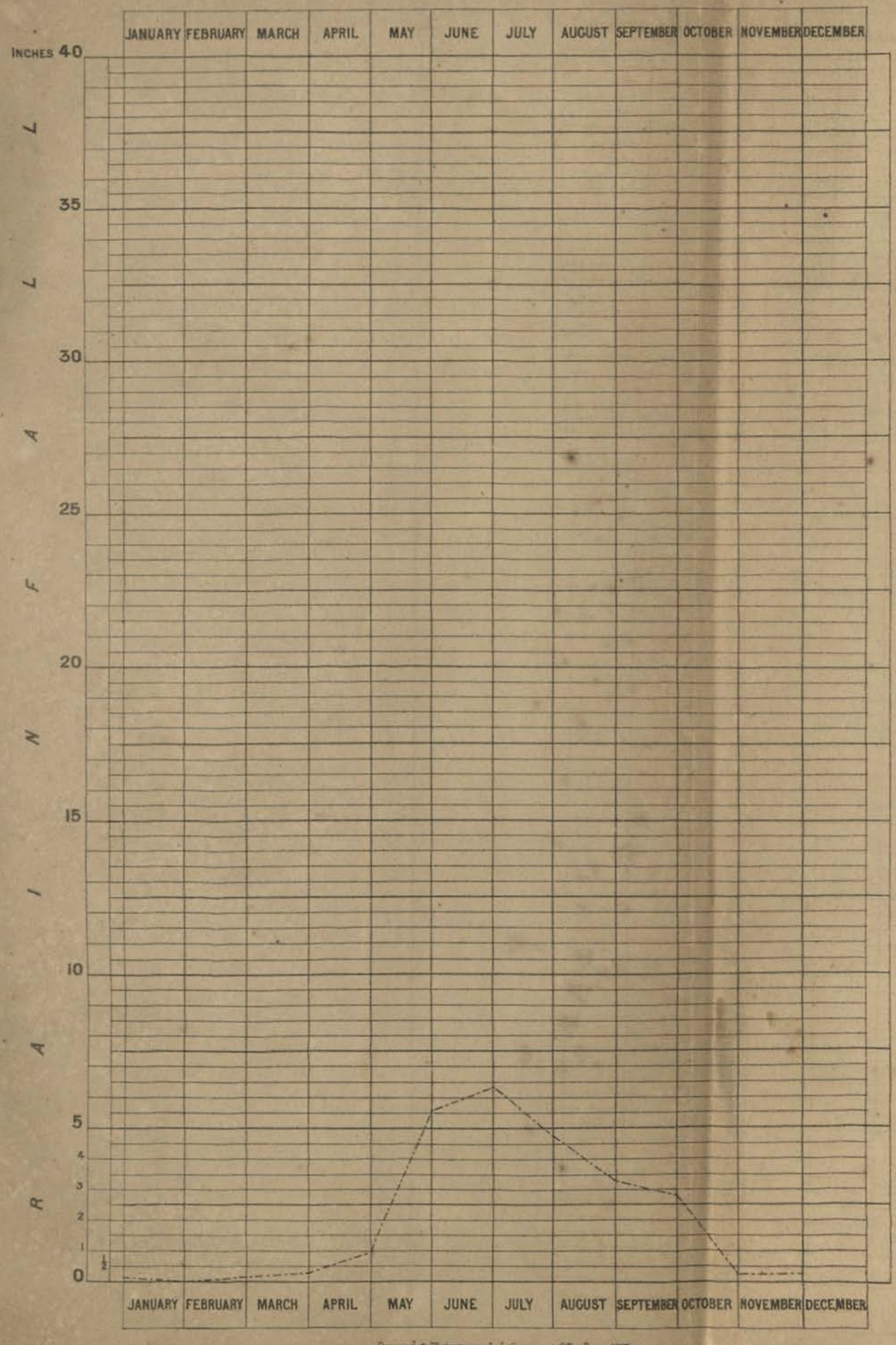
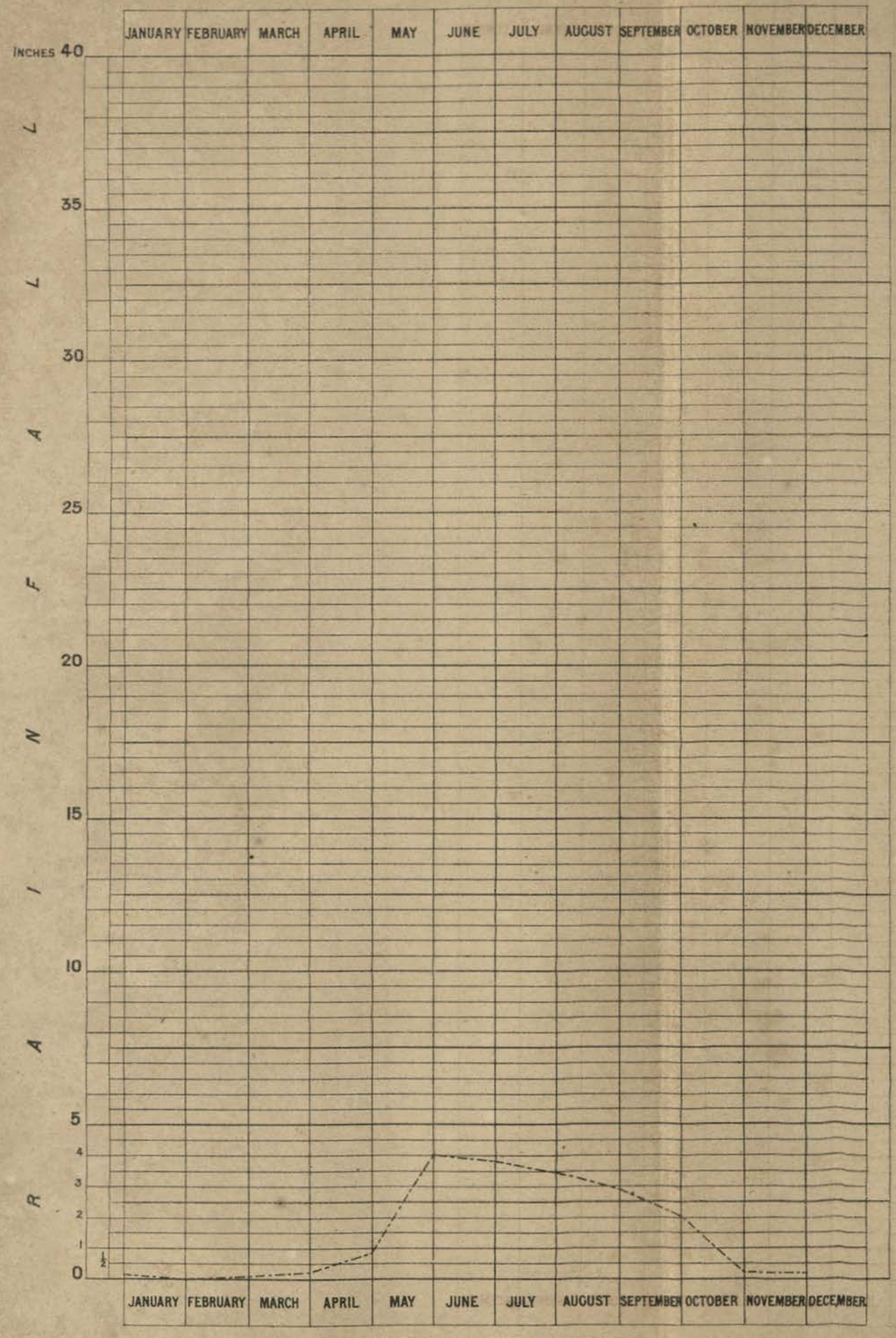
BELGAUM COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



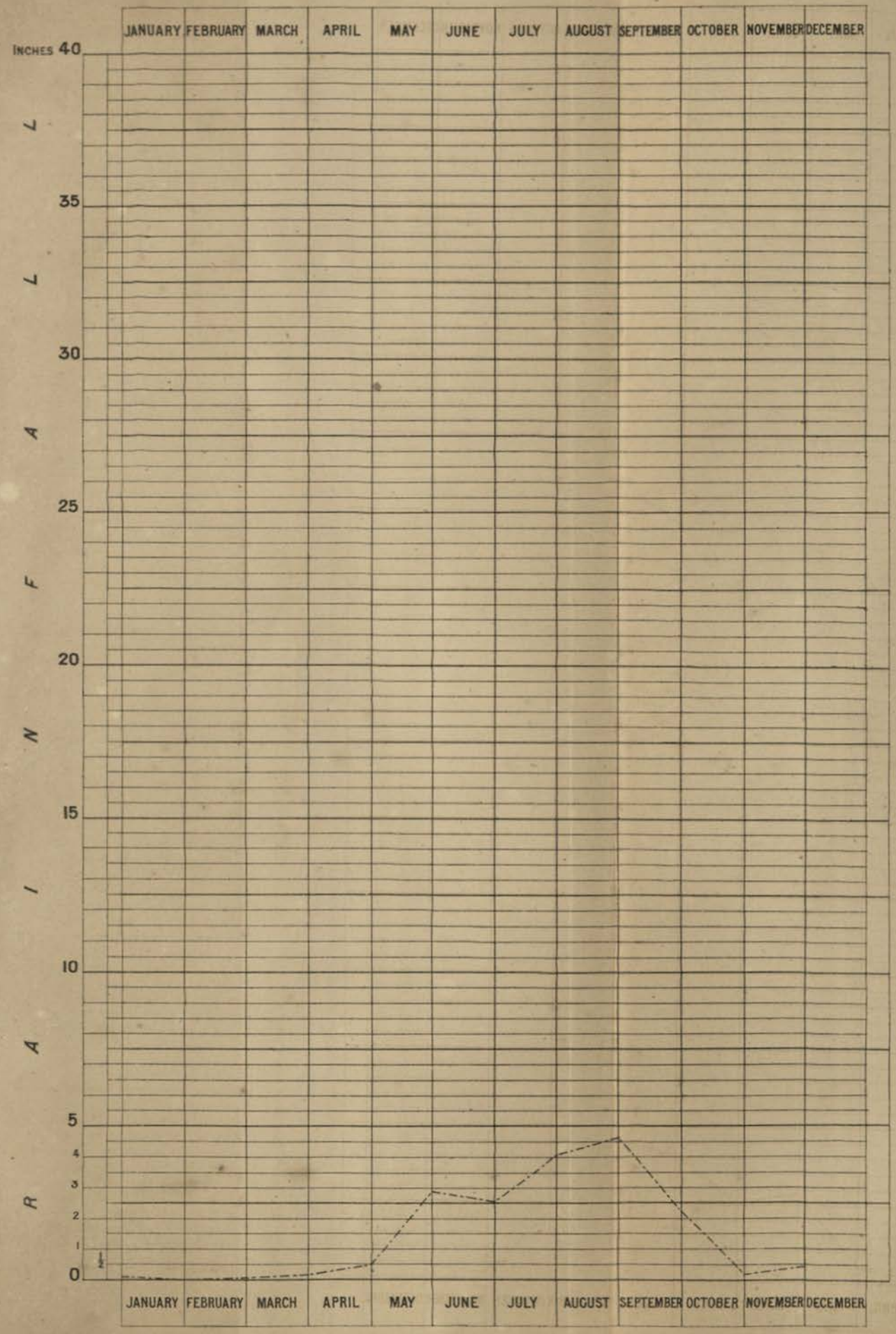
Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
DHARWAR COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1870

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
KALADCI COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Press 1873

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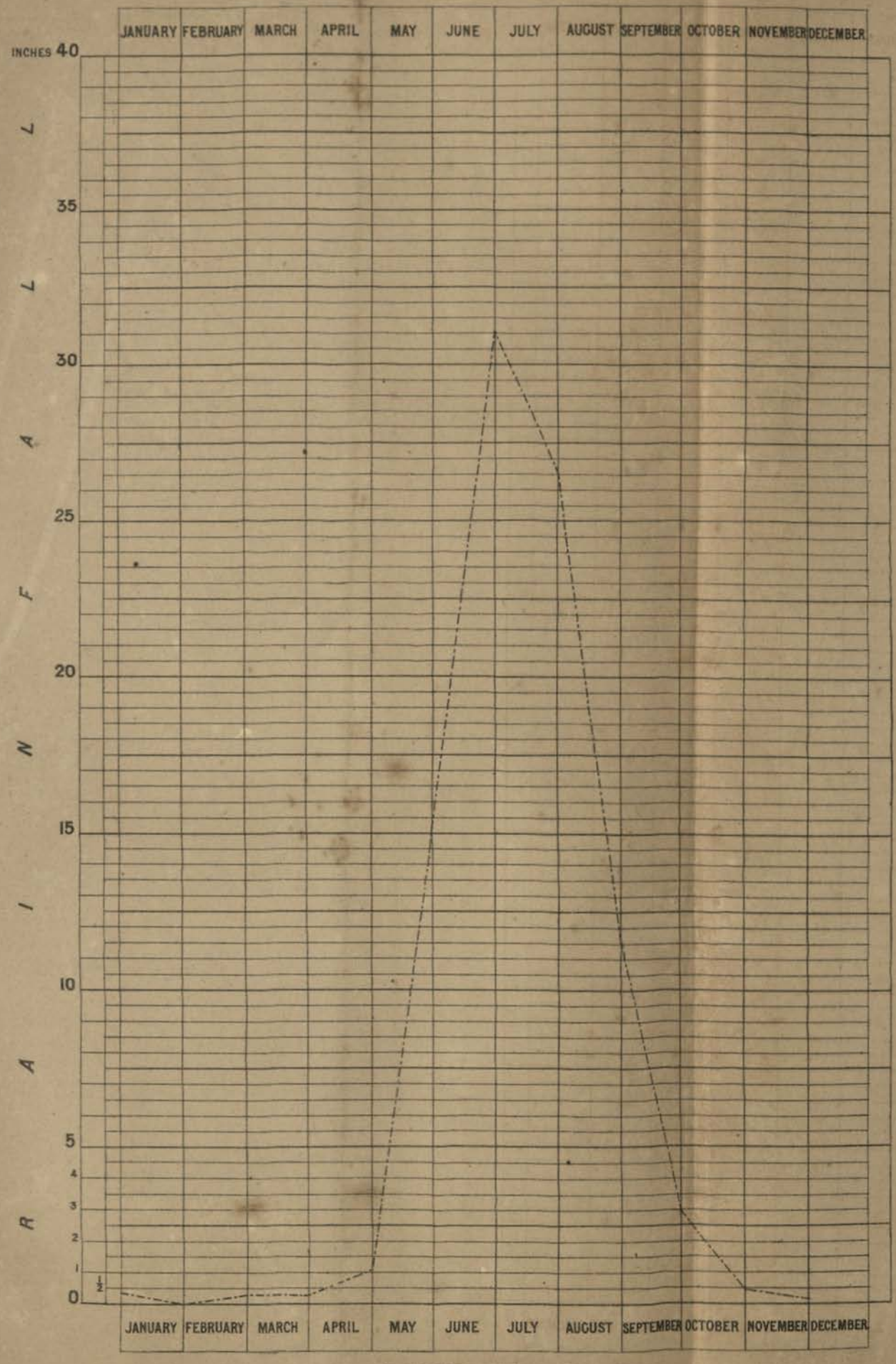
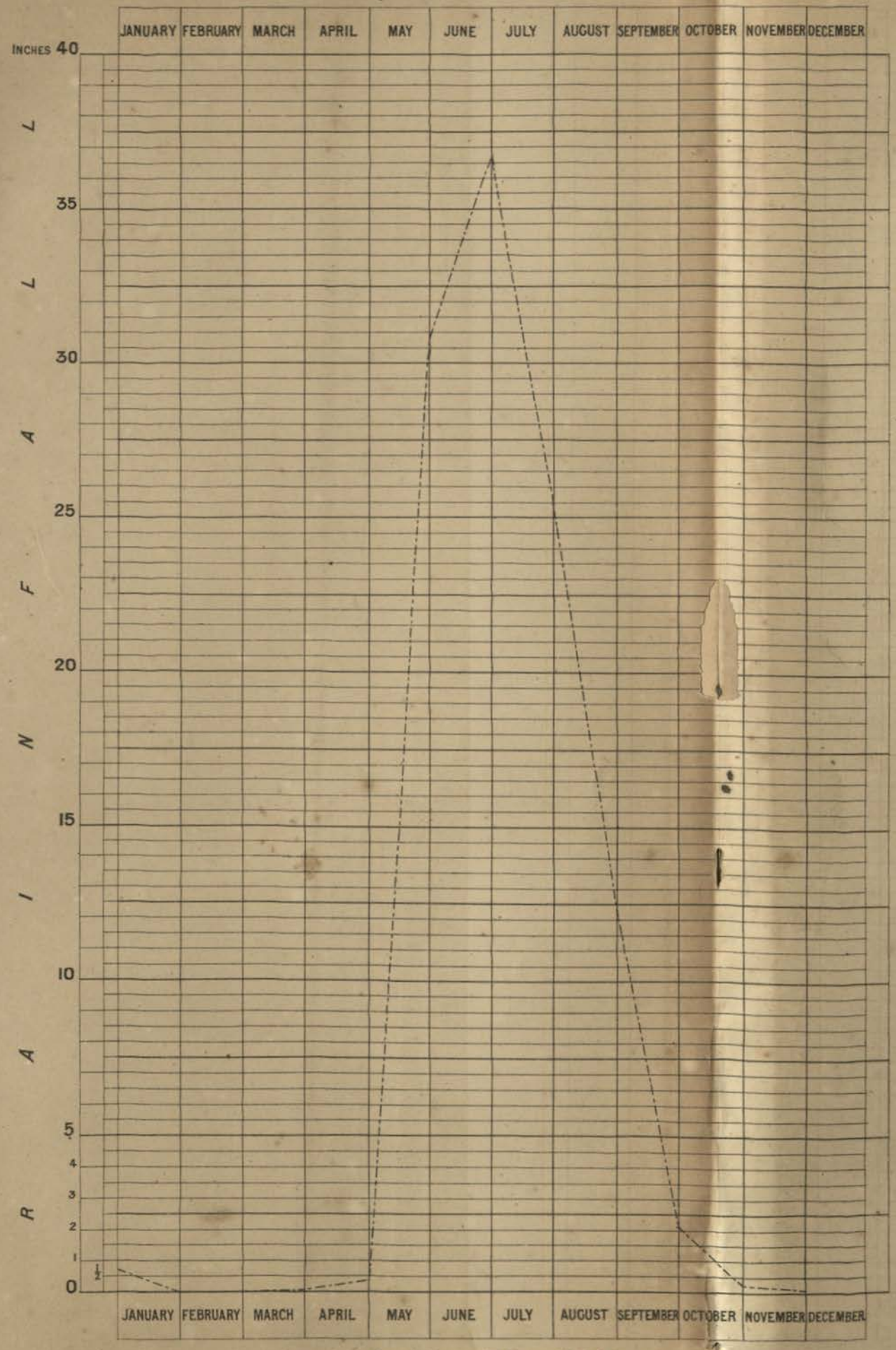
KANARA COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



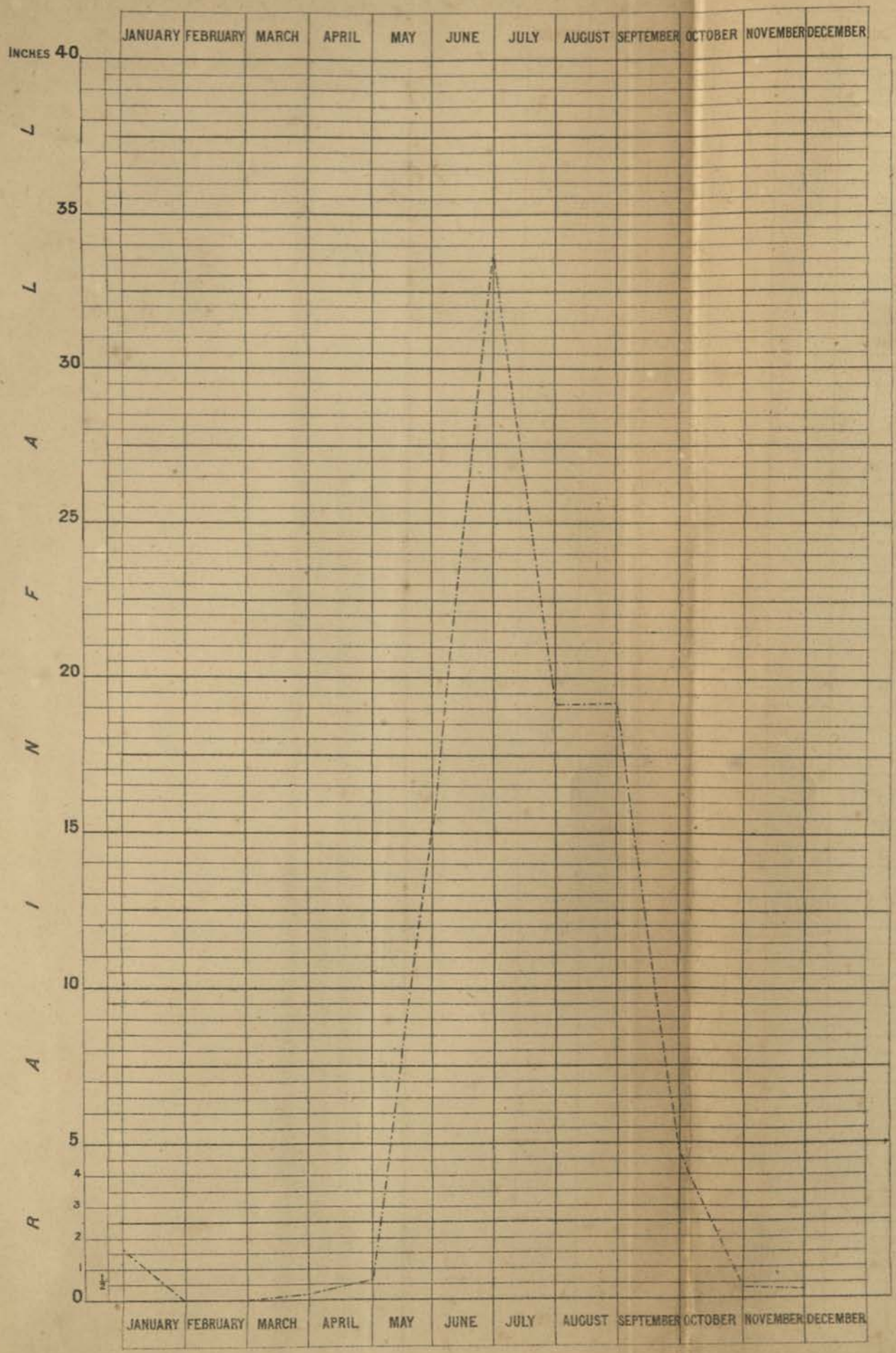
Prepared & Photozincographed at Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
RATNAGIRI COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



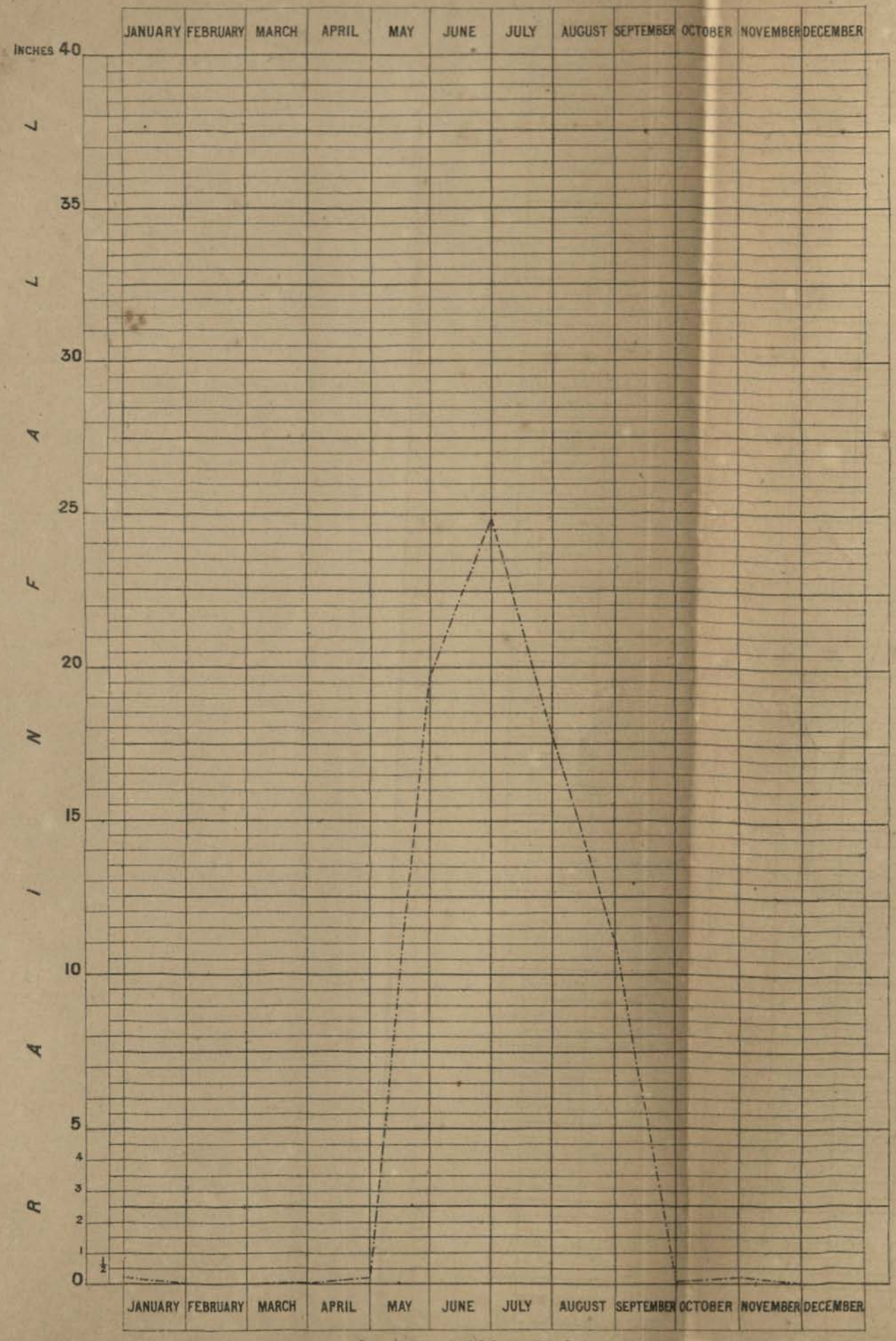
Prepared & Photozincographed Government Office Poona 1873.

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
COLABA COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



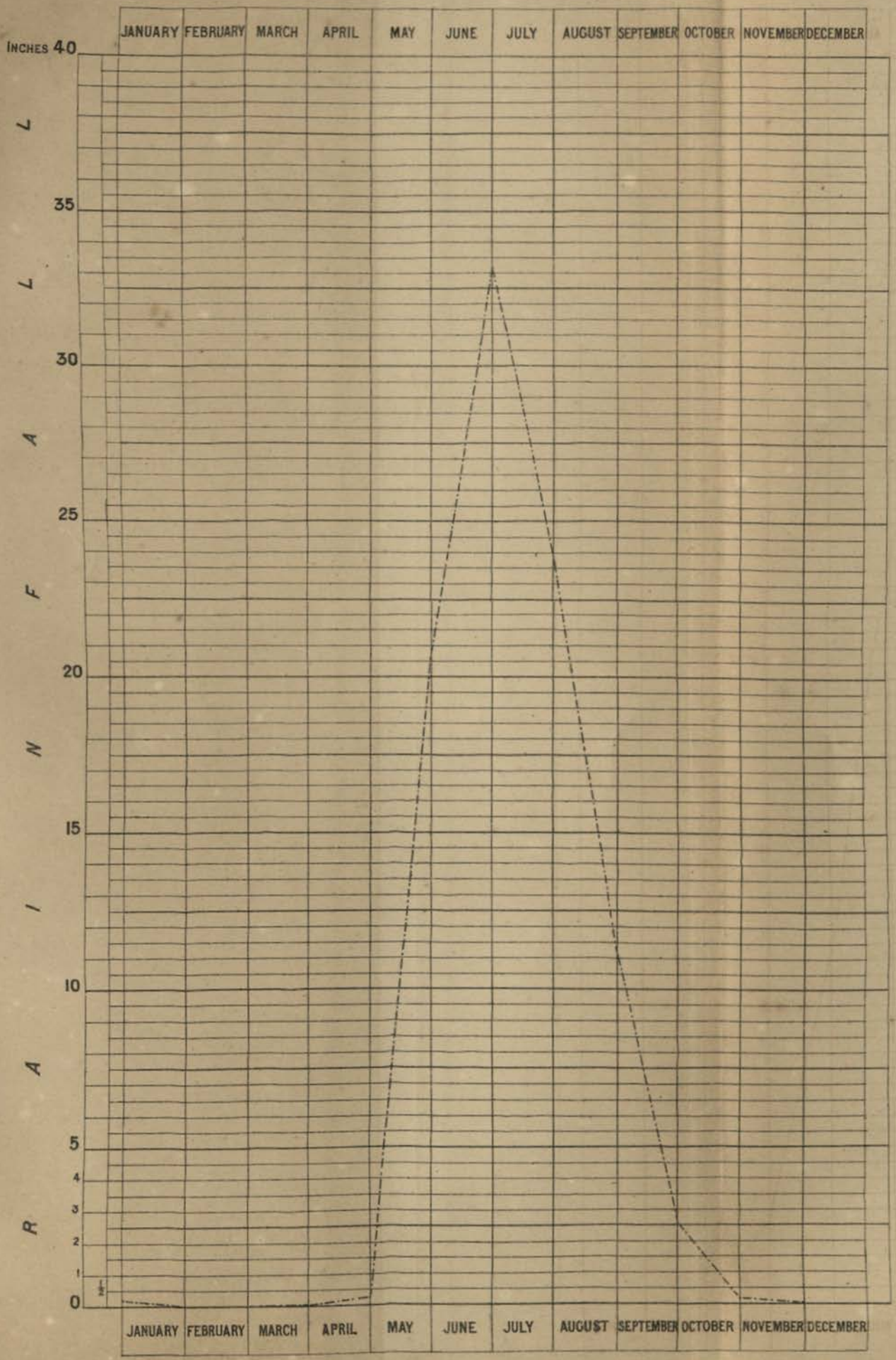
Prepared in Bombay Municipal Government Office June 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
BOMBAY CITY
FROM 1862 TO 1871 INCLUSIVE.



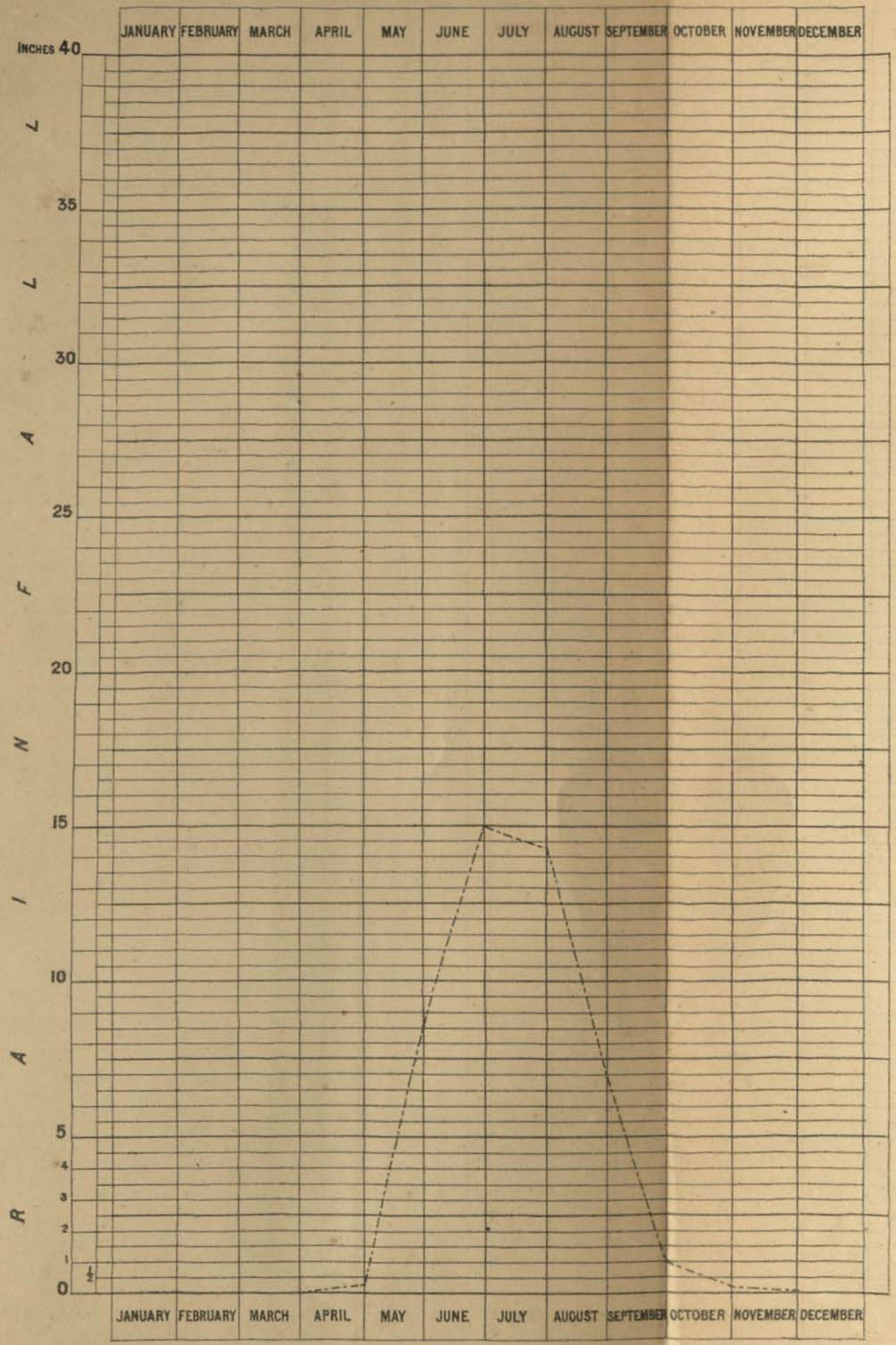
Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
TANNA COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



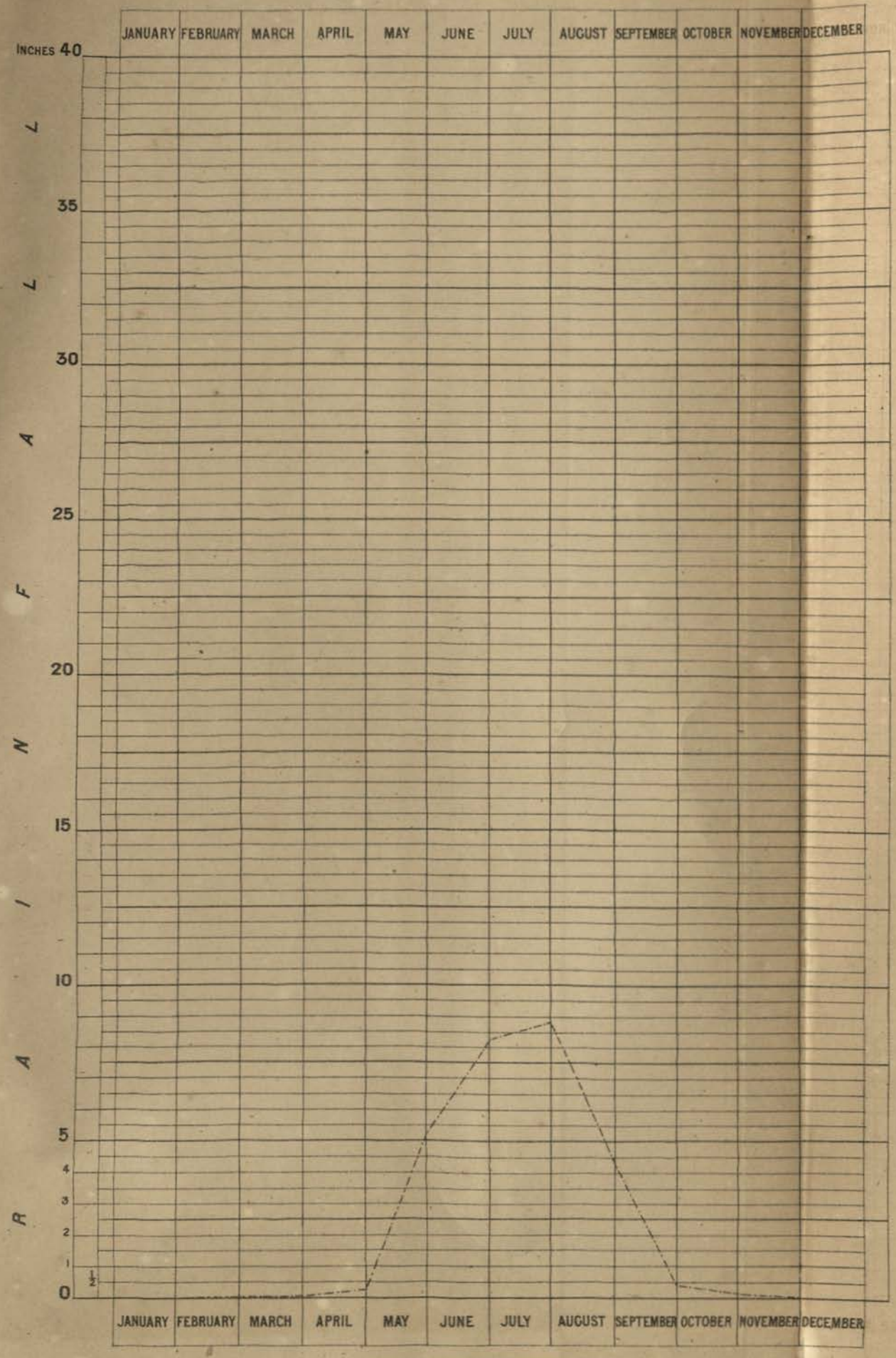
Prepared & Photozincographed Government Office Rome 1872

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
SURAT COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1873

DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
BROACH COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed at Government Office Poona 1873

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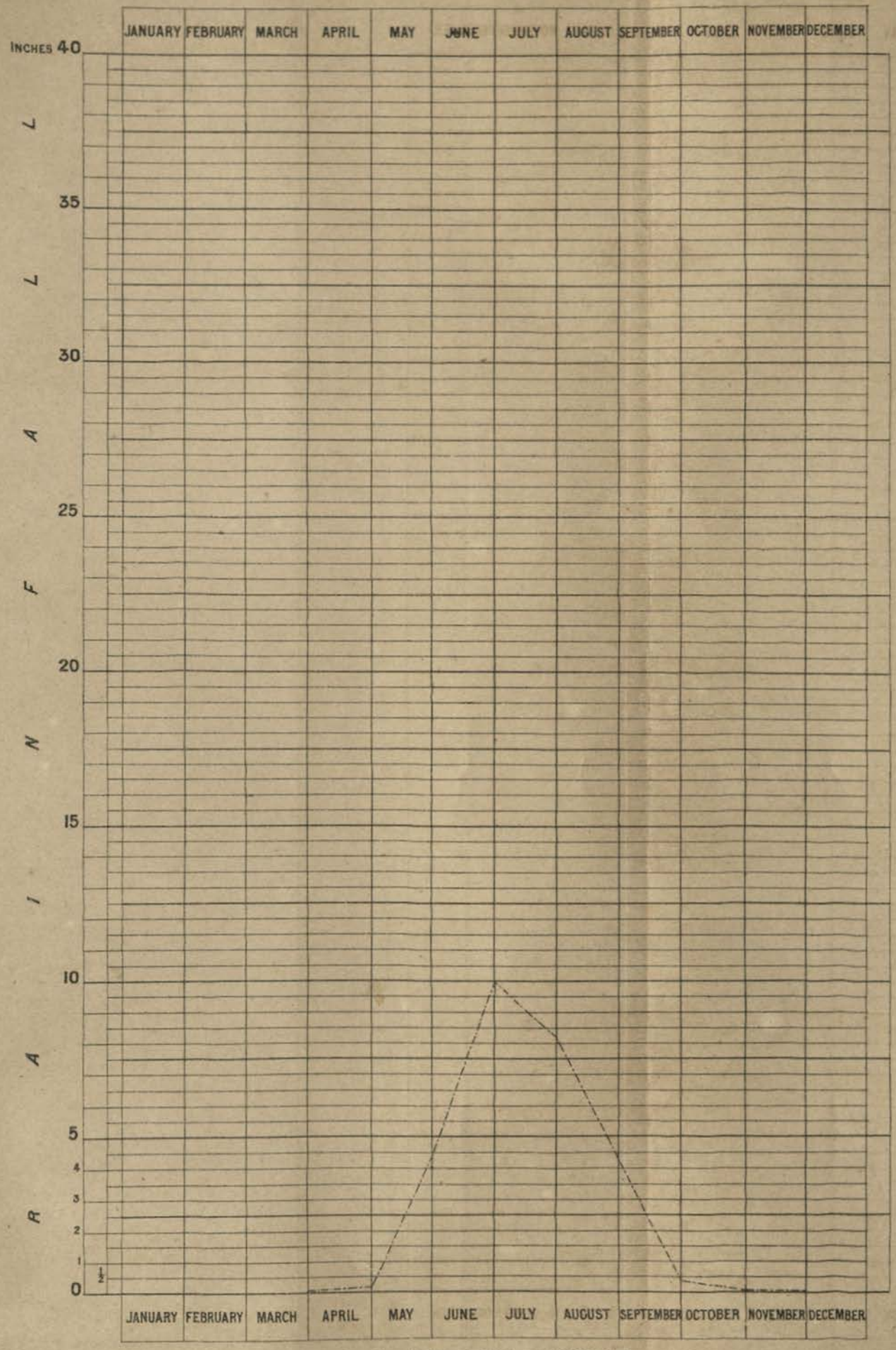
KHAIRA COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared at Photozincographic Government Office Poona 1872

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PANCH MAHALS
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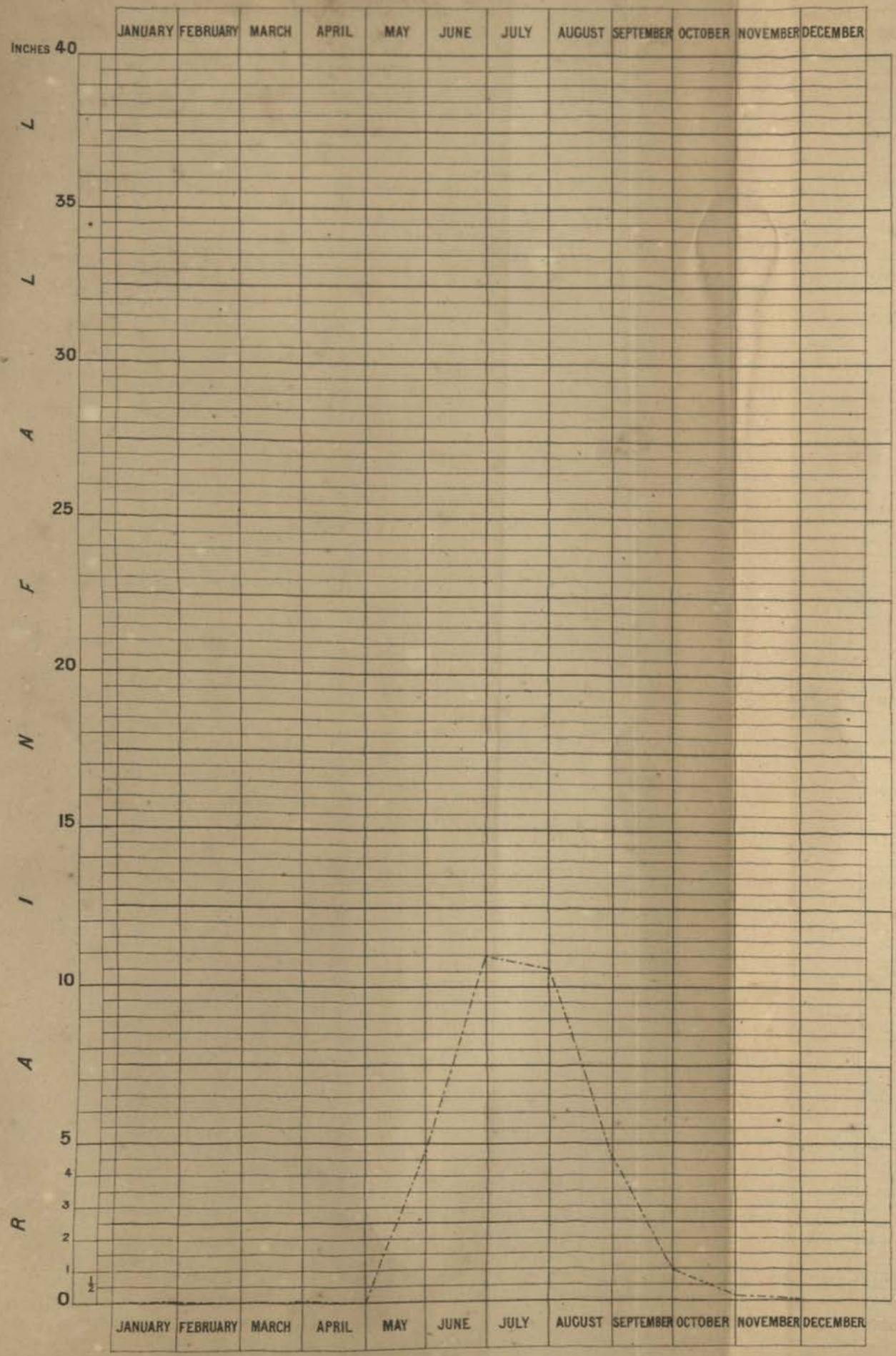

Prepared & Photozincographed Government Office Poona 1873

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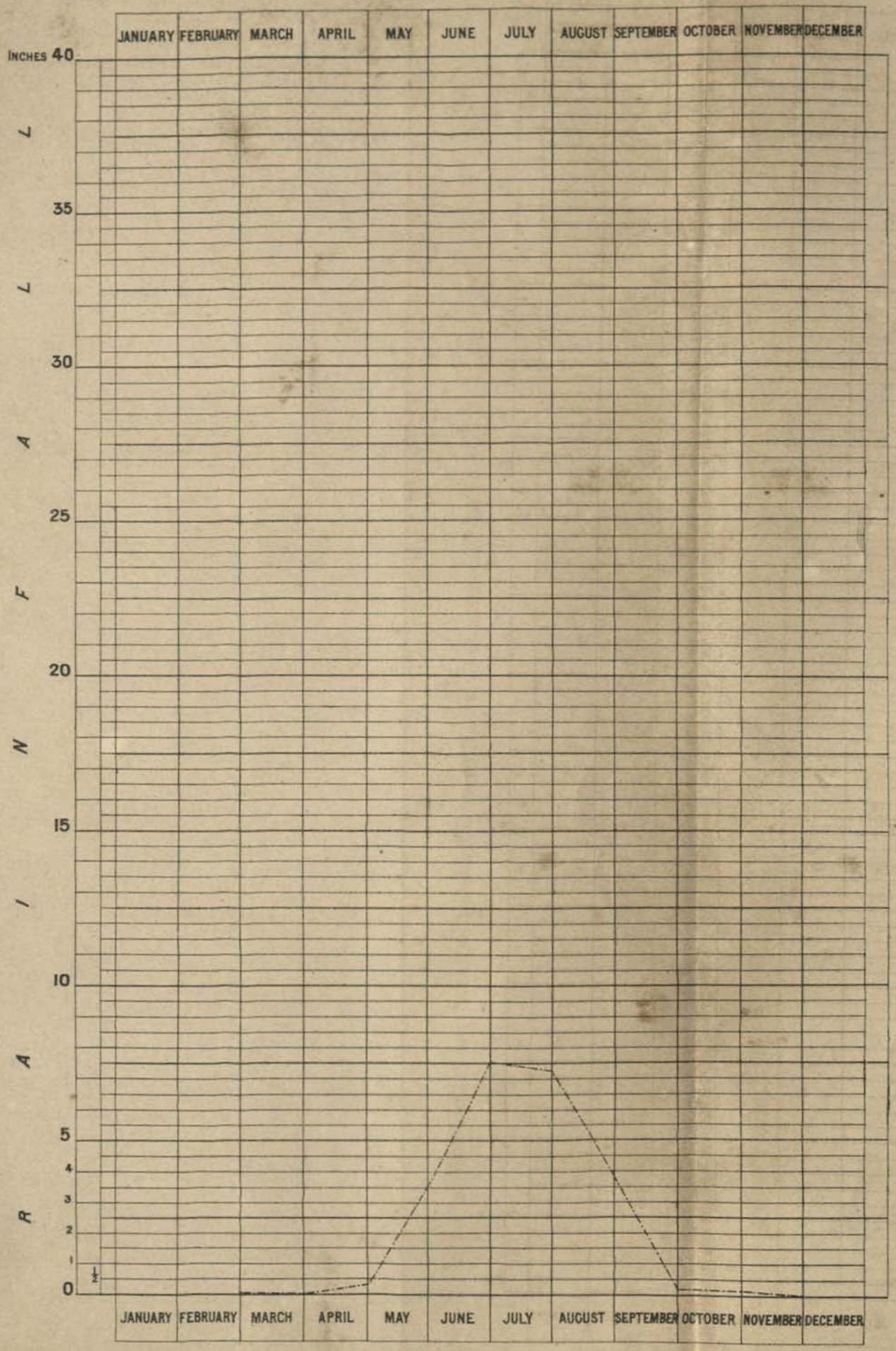
AHMEDABAD COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1873

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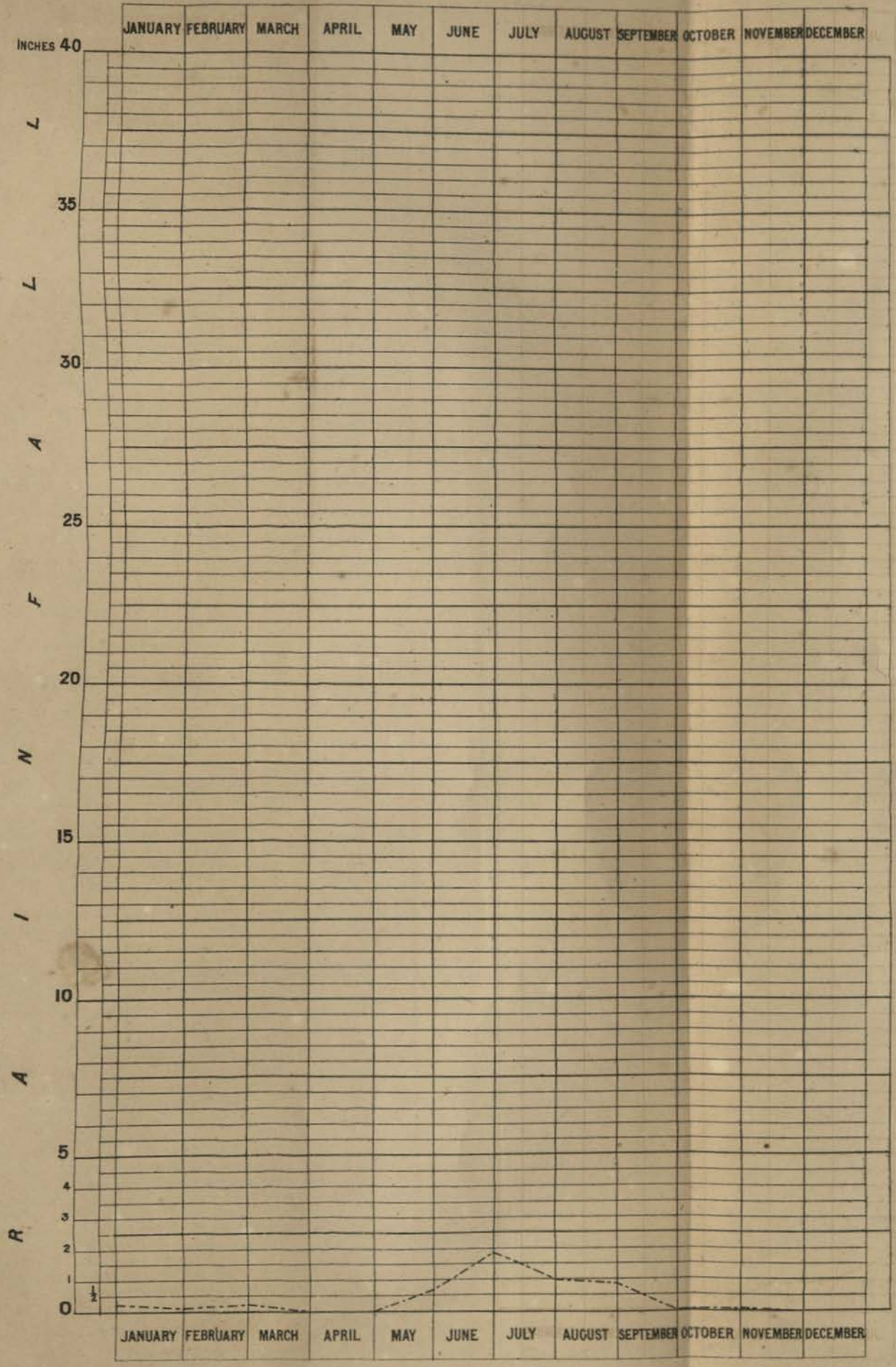
KURRACHEE COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed Government Office Poona 1873

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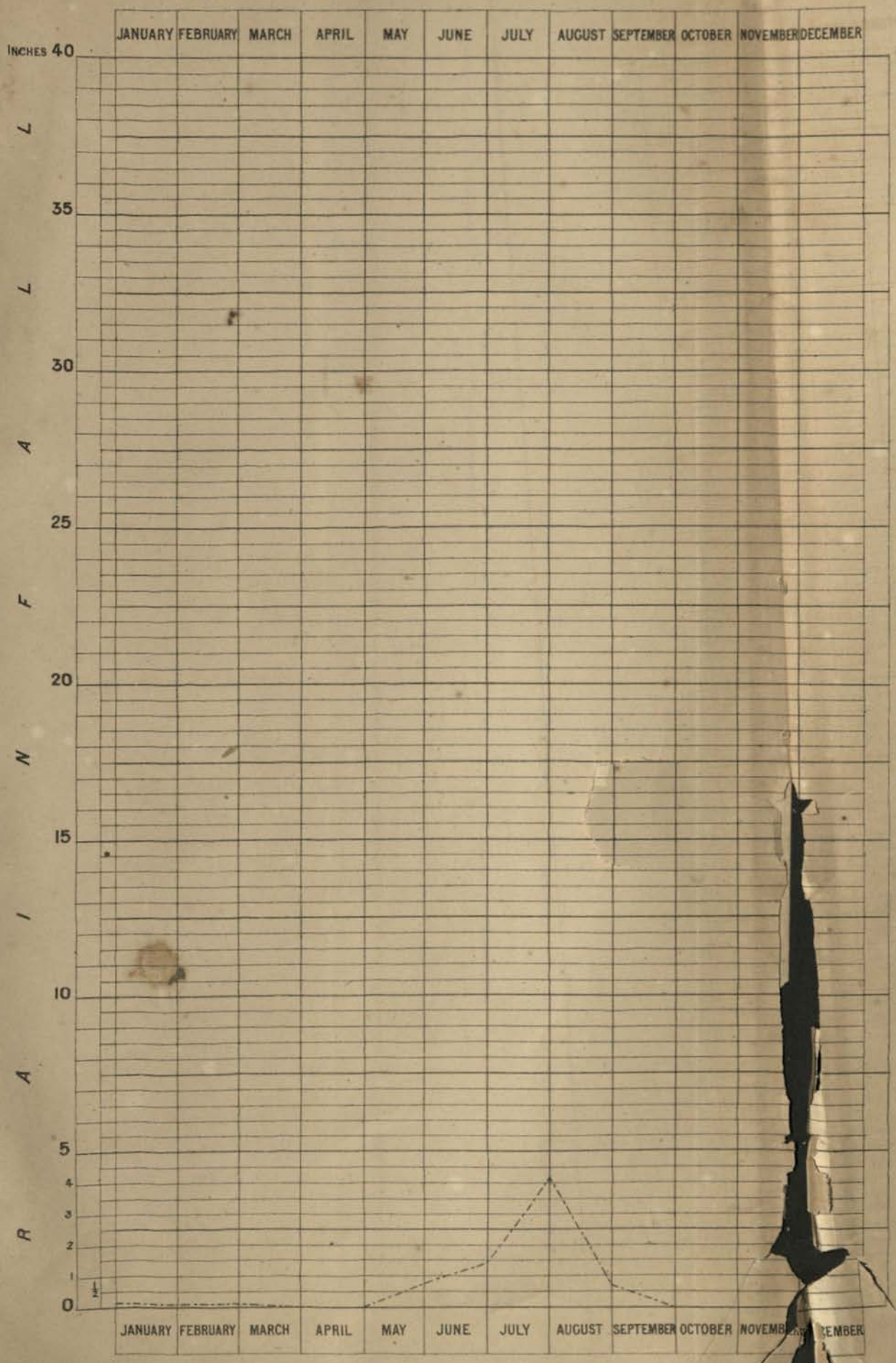
HAIDARABAD COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared at Photozincographed Government Office Poona 1873

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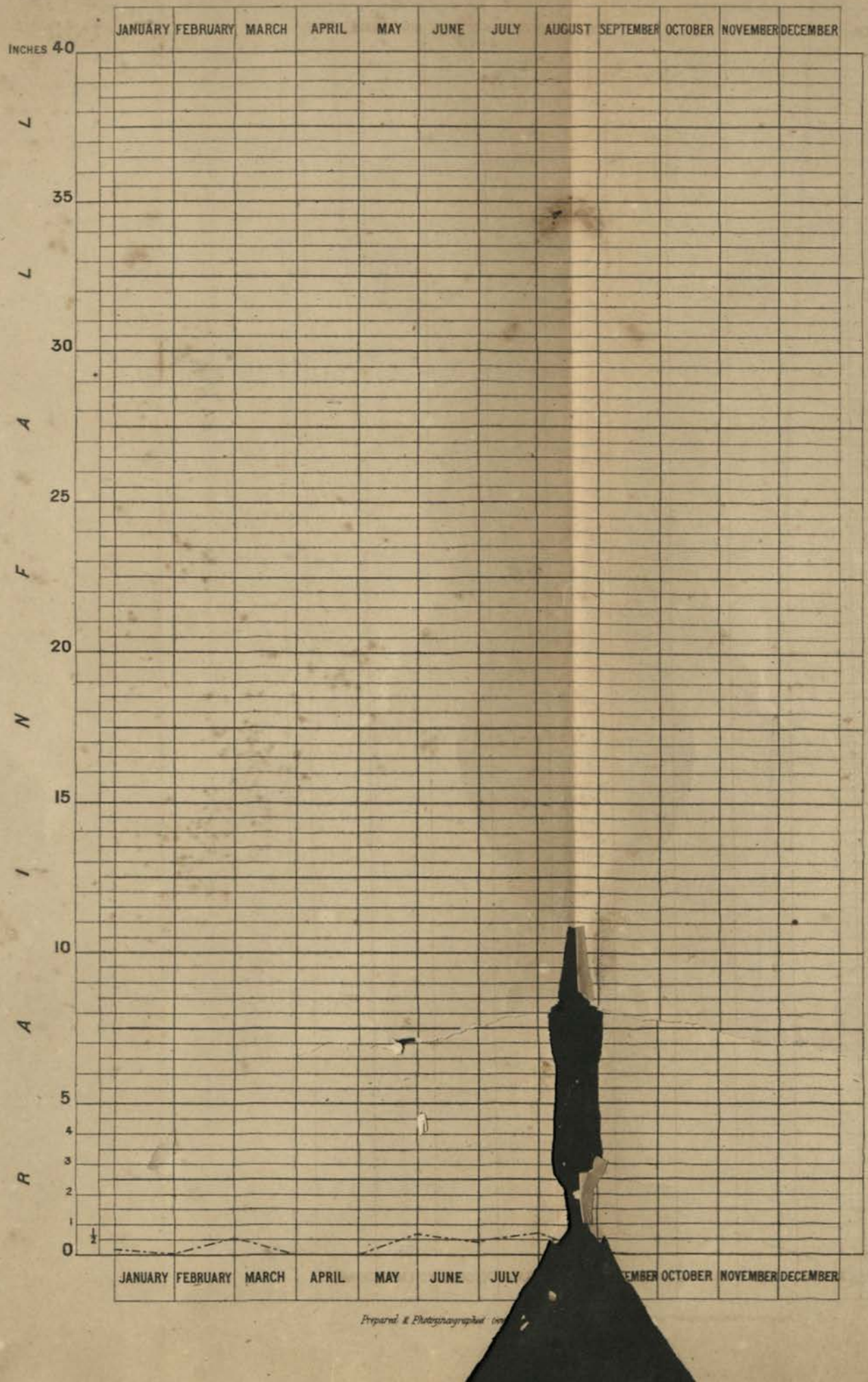
DIAGRAM SHOWING THE MEAN MONTHLY RAIN-FALL
SHIKARPUR COLLECTORATE
FROM 1862 TO 1871 INCLUSIVE.



Prepared & Photozincographed (on